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FEDERAL RADIOLOGICAL MONITORING AND ASSESSMENT CENTER

FRMAC Operations Manual

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FEDERAL RADIOLOGICAL MONITORING AND ASSESSMENT CENTER

FRMAC Operations Manual

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PREFACE

The Initial National Response Plan (I-NRP) was issued September 30, 2003. The I-NRP implements the roles and responsibilities of the Secretary of Homeland Security as defined in Homeland Security Presidential Directive 5 (HSPD-5). With the I-NRP, the FRP (Federal Response Plan) and FRERP (Federal Radiological Emergency Response Plan) remain in effect during the interim period with the I-NRP taking precedence over other plans where they may conflict. Under the FRERP, the Federal agencies with statutory responsibilities for dealing with radioactive materials emergencies have agreed to coordinate their emergency response efforts. The I-NRP creates the following: National Homeland Security Operations Center (HSOC) for operational communications and information regarding domestic incident management; the Interagency Incident Management Group (IIMG) that facilitates national level incident management and coordination. It also identifies that a Principle Federal Official (PFO) to represent the DHS secretary at the incident. The I-NRP identifies what federal entities will be integrated into a Joint Field Office (JFO) whenever possible.

In the event of a potential or existing major radiological incident, the U.S. Department of Energy's National Nuclear Security Administration Nevada Site Office (NNSA/NSO) has been charged with establishing and operating the Federal Radiological Monitoring and Assessment Center (FRMAC). The FRMAC provides coordinated federal assistance in the off-site areas to the impacted state(s) and the lead federal agency responsible for regulation and/or operation of the accident site.

This manual was written for those personnel who will be called upon to provide technical data, input, and decisions. Overall, this manual provides general guidance and some specific diagrams and forms. However, it is understood that site and event specific operational decisions and procedure parameters will need to be established and documented at the time of an emergency event. This manual is intended to provide enough guidance for stand-alone use without limiting FRMAC's ability to integrate the work with other partners or stakeholders.

The NNSA/NSO has the overall responsibility for maintaining the master copy of all FRMAC manuals. Please provide comments on this manual to:

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This publication, *FRMAC Operations Manual, DOE/NV/11718--080-Rev. 1,* supersedes the *FRMAC Operations Manual, Emergency Phase, DOE/NV/11718--080*. In addition, the publication entitled *Overview of FRMAC Operations, DOE/NV/11718--146-Rev. 5,* is hereby cancelled. Topics discussed in that document have been incorporated into this edition of the *FRMAC Operations Manual.* At a later date, an *Overview of FRMAC Operations* will be re-published in a brochure format. In addition, a new manual will also be written which will fully outline FRMAC logistics requirements and include all FRMAC position descriptions.

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ACRONYMS AND ABBREVIATIONS

AFB.....Air Force Base
ALARA.....As Low as Reasonably Achievable
AMS.....Aerial Measuring System
CMO .....Consequence Management Official
CMHT.....Consequence Management Home Team
CMPT.....Consequence Management Planning Team
CMRT .....Consequence Management Response Team
DFO.....Disaster Field Office
DHS.....U.S. Department of Homeland Security
DOC .....U.S. Department of Commerce
DoD.....U.S. Department of Defense
DOE .....U.S. Department of Energy
DOE/HQ .....DOE Headquarters
DOI .....U.S. Department of Interior
DOJ .....U.S. Department of Justice
DOS.....U.S. Department of State
DOT .....U.S. Department of Transportation
ECN.....Emergency Communications Network
EDE.....Effective Dose Equivalent
EOC.....Emergency Operations Center
EPA .....U.S. Environmental Protection Agency
EPZ .....Environmental Protection Zone
ERDS .....Emergency Response Database System
FCO.....Federal Coordinating Officer
FDA.....U.S. Food and Drug Administration
FEMA .....Federal Emergency Management Agency
FRERP .....Federal Radiological Emergency Response Plan
FRMAC.....Federal Radiological Monitoring and Assessment Center
FRMAP.....Federal Radiological Monitoring and Assessment Plan

FRPCC .....Federal Radiological Preparedness Coordinating Committee
FRP .....Federal Response Plan
GIS .....Geographic Information System
GPS .....Global Positioning System
GSA.....General Services Administration
HHS.....U.S. Department of Health and Human Services
HPGe.....high-purity Germanium
HUD.....U.S. Department of Housing and Urban Development
I-NRP .....Initial National Response Plan
JIC.....Joint Information Center
JOC .....Joint Operations Center
keV.....kiloelectron volts
km .....kilometer
LFA .....Lead Federal Agency
LLNL .....Lawrence Livermore National Laboratory
$\mu Ci/m^2$ .....microcuries per square meter
µR/hr .....microroentgen per hour
mR.....milliroentgen (unit of exposure to x- or gamma-radiation)
MRE.....meals ready to eat
Mrem.....millirem (a unit of radiation dose)
NaI(T*l*) .....sodium iodide thallium activated
NARAC.....National Atmospheric Release Advisory Capability
NASA.....National Aeronautics and Space Administration
NCS.....National Communications System
NIMS.....National Incident Management System
NNSA/HQ.....National Nuclear Security Administration Headquarters
NNSA/NSO.....National Nuclear Security Administration Nevada Site Office
NOAA .....National Oceanic and Atmospheric Administration
NRC .....U.S. Nuclear Regulatory Commission
NRP.....National Response Plan
NSA.....National Security Area
OSC.....On-Scene Coordinator
PAG.....Protective Action Guide

PAO.....Public Affairs Officer
PAR.....Protective Action Recommendation
psi.....pounds per square inch
RAP.....Radiological Assistance Program
RCO.....Regional Coordinating Office
REAC/TS.....Radiation Emergency Assistance Center/Training Site
rem.....roentgen equivalent man (a unit of radiation dose)
RERT.....Radiological Emergency Response Team
RSL.....Remote Sensing Laboratory
SEO.....Senior Energy Official
SFO.....Senior FEMA Official
SHARC.....Sandia Hazard Assessment Response Capability
SNL.....Sandia National Laboratories
SSA.....Senior Scientific Advisor
TEDE.....Total Effective Dose Equivalent
TLD.....thermoluminescent dosimeter
USDA.....U.S. Department of Agriculture
VA.....U.S Department of Veterans Administration

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1.0 INTRODUCTION

1.1 Purpose

In the event of a major radiological emergency, 17 Federal agencies with various statutory responsibilities have agreed to coordinate their efforts at the emergency scene under the umbrella of the Federal Radiological Emergency Response Plan (FRERP). These agencies are listed in Appendix A. This cooperative effort will assure the designated Lead Federal Agency (LFA) and the state(s) that all Federal radiological assistance efforts fully support their objective to protect the public. The mandated Federal cooperation ensures that each agency can obtain the data critical to its specific responsibilities.

This manual describes the Federal Radiological Monitoring and Assessment Center's (FRMAC) response activities in a major radiological emergency.[1] It also describes the Federal assets and subsequent operational activities which provide Federal radiological monitoring and assessment of the affected areas. These areas may include one or more affected states or other countries/territories.

1.2 Radiological Response in Perspective

When a radiological emergency occurs, the highest priority is protecting the public. All Federal response activities are focused on assisting the state(s) in accomplishing this. Whether real or perceived, public health concerns will remain the paramount priority during the entire response activity. Response activities will begin with computer projections to make rapid, early recommendations. These projections will also drive the monitoring response activities. Once the data has been collected and assessed at the FRMAC, the projections will be refined to assist the state in taking actions to prevent or minimize hazards to the public, and data can be translated into dose projections.

The term "on-site" traditionally describes the area inside the fence line or property line of the facility which is experiencing the emergency. This concept was developed with nuclear power plants as the benchmark, and the belief that the boundary between "on-site" and "off-site" would be fixed and permanent. Emergency response plans and procedures have evolved significantly since the terrorist events of September 11, 2001, and the connotation of the terms "off-site" and "on-site" has been redefined as follows:

> In the event of a nuclear weapon accident, the term "on-site" refers to the area within the National Security Area (NSA). This boundary is established by the U.S. military and encompasses all regions where nuclear weapon components may be present. "Off-site" would denote all other external areas during the functioning of the NSA. As soon as the weapon is secured and all debris removed from the area, the NSA designation is removed. The state and/or local authorities assume control and

[1] The term "radiological emergency" is used throughout this report. It is applicable to an accident, an incident, a potential accident, or a potential, perceived, or deliberate act to spread radioactivity in the environment.

management of the response for the entire affected area. The FRMAC will incorporate the area into on-going monitoring operations.

If a terrorist event were to occur, "on-site" would be defined as the area where the Incident Commander defined a perimeter to identify the crime scene or area where dangers may still exist. Again, once the initial criminal and forensic investigation is completed, the "on-site" boundary would be lifted and the state or local authorities would assume control. The FRMAC would continue monitoring operations, and the former "on-site" area would now be part of the monitoring plan. "Off-site" would denote all other external areas.

In the event of a nuclear power plant or fixed facility event, the term "on-site" still refers to the area inside the fence or property line. "Off-site" would continue to refer to all areas outside the fence or property line.

1.3 Initial National Response Plan (I-NRP)

This document implements, on an interim basis, the domestic incident management authorities, roles, and responsibilities of the Secretary of Homeland Security as defined in Homeland Security Presidential Directive-5 (HSPD-5), Management of Domestic Incidents. This document also provides interim management pending development, coordination, and implementation of a full National Response Plan (NRP) and National Incident Management System (NIMS). It is applicable to domestic incident management in the context of terrorist attacks, major disasters, and other emergencies. The I-NRP leaves the FRP and FRERP in effect during the interim period and supersedes those plans where they may conflict.

The I-NRP creates the National Homeland Security Operations Center (HSOC) for operational communications and information regarding domestic incident management, the Interagency Incident Management Group (IIMG) that facilitates national level incident management and coordination, the Principle Federal Official (PFO) to represent the DHS secretary at the incident, and identifies that Federal entities will be integrated into a Joint Field Office (JFO) whenever possible.

1.4 Federal Response Plan (FRP)

"The FRP describes the structure for organizing, coordinating, and mobilizing Federal resources to augment state and local response efforts under the Stafford Act and its implementing regulations that appear in 44 CFR 206."[2] The Stafford Act establishes the Federal Emergency Management Agency's (FEMA's) on-scene Disaster Field Office (DFO) and creates the position of the Federal Coordinating Officer (FCO). The FCO is the President's representative and has the overall responsibility for coordinating the Federal response including the activities of the LFA. The FCO operates from the DFO and is usually a FEMA official. "In particular, the FRP may be implemented concurrently with the Federal Radiological Emergency Response Plan (FRERP), which details the

[2] *Federal Emergency Management Agency Federal Response Plan, 9230.1-PL, April 1999*

federal response to a peacetime radiological emergency." The FRP and the FRERP will not only be implemented concurrently, but the FRP response will be consistent with the FRERP.

The DFO is established by FEMA as the focal point for the coordination of all non-radiological support based on state requirements and priorities. Without a Stafford Act Declaration, Federal agencies will respond to a radiological emergency under the guidance of the FRERP. The LFA has the overall responsibility for coordinating the Federal response. In support of the LFA, FEMA is responsible for coordinating all non-radiological support using the structure of the FRP.

1.5 Federal Radiological Emergency Response Plan (FRERP)

"The objective of the Federal Radiological Emergency Response Plan (FRERP) is to establish an organized and integrated capability for timely coordinated response by Federal agencies to peace-time radiological emergencies."[3] Developed in 1982 after the Three Mile Island incident, the FRERP defines the scope of the Federal response as it applies to radiological emergencies that have potential or perceived consequences on the United States, territories, possessions, or territorial waters. Rather than being activated by a specific action, request, or criterion, the FRERP is used whenever any of the signatory Federal agencies responds to a radiological emergency, no matter what size.

The FRERP describes actions and responsibilities by which Federal, state, and local agencies can most effectively integrate their operations. The degree to which the Federal response is merged or activities are adjusted will be based on the requirements and priorities set by the LFA and the state(s). During the initial phase, the FRERP assigns to the U.S. Department of Energy (DOE) the establishment of the FRMAC and the coordination of the off-site Federal radiological monitoring and assessment activities with those of state and local agencies. The FRMAC Director is appointed from the DOE. The FRERP also assigns EPA the lead for long-term monitoring after the immediate emergency conditions have been stabilized; offsite releases of radioactive material have ceased, and there is little or no potential for further unintentional offsite releases. The FRERP also directs that an initial long-range monitoring plan be developed in conjunction with affected states and appropriate Federal agencies that provides assurances from other Federal agencies that they will commit the required resources, personnel, and funds for the duration of the Federal response.

Agencies responding to incidents in accordance with the FRERP maintain appropriate Emergency Operations Centers (EOCs) and receive incident reports and intelligence information relative to potential/actual radiological/nuclear incidents. This information will also be reported to the HSOC to support threat monitoring and domestic incident response management activities. As specified in the INRP, responding agencies will provide liaisons to the HSOC to further enhance information flow.

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[3] *Federal Register, Part III, Volume 61, No. 90, Federal Emergency Management Agency, Federal Radiological Emergency Response Plan, May 1996.*

1.6 Public and Private Sector Response

State, tribal, county, and/or city governments have primary responsibility for determining and implementing measures to protect health, safety, property, and the environment in all areas outside the boundaries of a fixed nuclear facility or those not under the control of a Federal agency. The owner or operator of a nuclear facility has primary responsibility for actions within the boundaries of that facility; for providing notification and advice to state, local, and tribal officials; and for minimizing the off-site radiological hazard to the public.

For emergencies involving an area under Federal control, the responsibility for on-site actions belongs to the Federal government while off-site actions are the responsibility of the state, tribal, and/or local governments. For all other emergencies, the state, tribal, and/or local government has the responsibility for taking emergency actions, both on-site and off-site.

Because the assignment of specific responsibilities for protecting the public varies from state to state and tribal, county, and city interests are involved as well, this manual employs the term *"local authorities"* to generically address the local group in the public sector (including tribal) that has radiological protection responsibilities for the public.

1.7 Federal Radiological Monitoring and Assessment Center (FRMAC) Mission

A FRMAC is established in response to the LFA or state request when there is a suspected release of radioactive materials or when a major radiological emergency is anticipated, suspected, or has occurred. The FRMAC becomes a coalition of all Federal off-site monitoring and assessment efforts to assist the LFA, state(s), and local authorities. State and local authorities are invited and encouraged to co-locate and prioritize monitoring and assessment efforts in the FRMAC.

A FRMAC provides an operational framework for coordinating all Federal off-site radiological monitoring and assessment activities during a response to a radiological emergency to support the LFA and state(s). The support provided includes:

1. Coordinating Federal offsite radiological environmental monitoring and assessment activities;
2. Maintaining technical liaison with state and local agencies with monitoring and assessment responsibilities;
3. Maintaining a common set of all offsite radiological monitoring data, in an accountable, secure, and retrievable form, and ensuring the technical integrity of the FRMAC data;
4. Providing monitoring data and interpretations, including exposure rate contours, dose projections, and any other requested radiological assessments, to the LFA, and to the states;
5. Providing, in cooperation with other Federal agencies, the personnel and equipment needed to perform radiological monitoring and assessment activities;
6. Requesting supplemental assistance and technical support from other Federal agencies as needed; and

7. Arranging consultation and support services through appropriate Federal agencies to all other entities (e.g., private contractors) with radiological monitoring functions and capabilities, and technical and medical advice on handling radiological contamination and population monitoring.

Potential radiological emergencies that fall within the scope of a FRMAC activation vary widely in terms of the area affected, the nature of the contamination, and the scope of the government's response. Detonation of a nuclear device, accidental release of radiation from a nuclear power plant, and a terrorist threat are just a few of the many possible scenarios that the FRMAC must be prepared to address. Through all this, supporting the state and local organizations in the protection of the public remains the primary goal of the Federal response.

2.0 RESPONSIBILITIES

The management responsibilities for a Federal radiological emergency response are divided among several agencies and organizations. These responsibilities are discussed below.

2.1 Lead Federal Agency (LFA)

The LFA is the Federal agency which has responsibility for all aspects of the Federal response. The LFA is defined as the Federal agency that owns, authorizes, regulates, or is otherwise deemed responsible for the facility or radiological activity causing the emergency and has authority to take action on site. The five LFAs delineated under the FRERP are the U.S. Department of Energy (DOE), U.S. Nuclear Regulatory Commission (NRC), U.S. Department of Defense (DoD), U.S. Environmental Protection Agency (EPA), and the National Aeronautics and Space Administration (NASA). The I-NRP identifies the Federal Bureau of Investigation (FBI) as an LFA. When the I-NRP is published as the NRP it will combine these two plans

The LFA will:

1. Coordinate the overall activities (both on-site and off-site) of all Federal agencies during all phases of a radiological emergency response.
2. Oversee on-site response and support operator activities.
3. Assist state(s) and local authorities in determining appropriate measures to protect the public, property, and the environment.
4. Coordinate and provide all Federal Protective Action Recommendations (PARs) to the state(s) and local authorities.
5. Ensure that Federal agencies assist state(s) and local authorities in implementing protective actions, if requested.
6. Serve as the principal Federal source of information for on-site conditions; coordinate all public information on Federal response activities; and provide information to Congress, the White House, and the Department of State (when foreign countries are affected).

7. Establish on-scene response centers:
   - The Joint Operations Center (JOC) is the coordination center for the overall federal response.
   - The Joint Information Center (JIC) coordinates information to the public and media.

2.2 Department of Homeland Security (DHS)

When a terrorist attack, major disaster, or other emergency occurs, the Secretary of the Department of Homeland Security (DHS) may designate a Federal officer to serve as the Principal Federal Official (PFO) to represent the DHS Secretary at the incident and oversee and coordinate Federal activities relevant to the incident. The PFO will ensure overall coordination of Federal domestic incident management activities and resource allocation on scene, ensuring a seamless integration of Federal incident management activities in support of state, local, and tribal requirements.

2.3 Department of Homeland Security/Federal Emergency Management Agency (FEMA)

The Senior FEMA Official (SFO) will coordinate the overall non-radiological Federal off-site support to the LFA, state(s), and local authorities. The general responsibilities of the SFO and the FEMA Emergency Response Team are to:

1. Manage the DFO which coordinates all non-radiological Federal resource support provided to the state(s) and local authorities.
2. Promote coordination among Federal agencies with the state(s) and local authorities concerning interactions on non-radiological issues.
3. Serve as the coordinator for information related to the Federal non-radiological response.

2.4 U.S. Department of Energy (DOE)

The FRERP assigns to DOE the responsibility for establishing and initially managing the FRMAC.

Under the FRERP, when a FRMAC is activated, DOE's responsibilities are to:

1. Provide technical support to the LFA, state(s), and local authorities by establishing the FRMAC and coordinating the off-site Federal radiological monitoring, assessment, and evaluation of data.
2. Provide various operational assets including radiation detection and measurement equipment, communications support, and aerial monitoring capability, as appropriate.
3. Following the initial phase of the emergency, provide off-site support to the EPA when it assumes management of the FRMAC.

2.4.1 Association Between DOE and NNSA (National Nuclear Security Administration)

The NNSA is a semi-autonomous branch of DOE whose mission is to strengthen the security of the United States by applying nuclear science and technology to military purposes and by reducing the global threat from weapons of mass destruction.

DOE Headquarters (DOE/HQ) has assigned the responsibility for FRMAC to the National Nuclear Security Administration Nevada Site Office in Las Vegas, Nevada (NNSA/NSO). This office provides day-to-day management; development of FRMAC plans, procedures, and exercise coordination; and oversight of working groups.

2.5 U.S. Environmental Protection Agency (EPA)

The FRERP assigns to EPA the responsibility for managing the FRMAC during the intermediate and long-term phases of a response. Throughout a response, EPA provides response support through its Radiological Emergency Response Team (RERT), which is an independent special team specified in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The RERT provides support to both the FRMAC and EPA's On-Scene Coordinators (OSCs) under the NCP.

The EPA's Senior Official in the FRMAC is typically one of the RERT commanders. The EPA Senior Official (SO) is to advise the DOE FRMAC Director during the emergency and intermediate phases of the response for issues specific to long-term monitoring and recovery that might be implemented during earlier phases. At an appropriate time during an intermediate phase, the EPA SO will begin a dialogue culminating in a transfer of FRMAC control from DOE to EPA.

After these conditions are met and a formal document is signed, the EPA will assume the Federal agency responsibility for coordinating the intermediate- and long-term off-site radiological monitoring, sampling, and assessment activities. When this occurs, DOE and other Federal agencies will continue to commit the equipment, personnel, and funds for the duration of the Federal response effort as necessary. Concurrence from other Federal, state, or local entities may be necessary.

After transfer, the EPA FRMAC Director will work with whatever cleanup group (Site Restoration Working Group, Decontamination Committee, etc.) is in charge of the overall cleanup. The FRMAC will continue to provide monitoring data for cleanups as well as keep reassessing problem areas.

In time, the EPA-led FRMAC will scale down into a smaller EPA and EPA-contractor entity. This will include relocating out of the original FRMAC location and establishing whatever near-site facility is necessary to accomplish the monitoring mission.

2.6 State and Local Authorities

State and local authorities are responsible for the health and welfare of the general public during an emergency. They will assess the situation and issue instructions for necessary protective actions. The state receives Federal PARs from the LFA which serves as the Federal channel for such recommendations.

2.7 Advisory Team for Environment, Food, and Health (A-Team)

The Advisory Team for Environment, Food, and Health (A-Team) provides advice on environment, food, and health matters to the state and LFA. The team consists of representatives of EPA, the U.S. Department of Health and Human Services (HHS), and the U.S. Department of Agriculture (USDA) supported by other Federal agencies, as warranted by the incident. The A-Team provides recommendations for field monitoring; emergency Protective Action Guides (PAGs) and their applications; Protective Action Recommendations (PARs) using data and assessment from the CM/FRMAC; protective actions to prevent or minimize contamination of milk, food, and water to prevent or minimize exposure through ingestion; recommendations to relocation, reentry, return, and recovery; the disposal of contaminated livestock; health and safety advice for the public and for workers; estimate effects of radioactive releases on human health and environment; and other matters as requested by the LFA.

The A-Team provides direct support to the LFA and has no independent authority. The A-Team will not release information or make recommendations to the public unless authorized to do so by the LFA.

To fulfill the needs of the LFA, the A-Team must interface with the CM/FRMAC to facilitate ready access to the CM/FRMAC data and assessments. The most efficient arrangement for this working relationship is for the A-Team to be housed within the FRMAC facility. During set-up operations, the CM/FRMAC support personnel will ensure an area is set aside so that the A-Team may operate independently, as well as in conjunction with CM/FRMAC operations. To ensure that the A-Team is able to work optimally, CM/FRMAC support personnel will ensure that electrical power and communications tools are available. CM/FRMAC groups (Monitoring, Assessment, etc.) will work closely with the A-Team as the situation dictates, or when requested. The A-Team will utilize the FRMAC Action Request form (see paragraph 4.4.1) to ensure documentation and clear understanding of all data and assessment requirements.

2.8 Other Federal Agencies

All other Federal agencies, not previously identified as having a management and/or support role, will respond in accordance with the FRERP, and other inter-agency agreements subordinate to the FRERP, at the request of the DHS, LFA, DOE, or the impacted state(s) or in accordance with established statutory responsibilities.

2.9 Public Information Coordination

Public information coordination is most effective when the owner/operator, Federal, state, local, and other relevant information sources participate jointly. The primary location for linking these sources is the Joint Information Center (JIC).

Prior to the establishment of Federal operations at the JIC, it may be necessary to release Federal information regarding public health and safety. In these instances, Federal agencies will coordinate

with the LFA and the state(s) in advance or as soon as possible after the information has been released.

3.0 ACTIVATION

3.1 Description of the Emergency

When DHS or DOE are formally notified of a radiological emergency and a FRMAC is requested, DOE will obtain a description, as detailed as possible, of the emergency. To ensure a timely and appropriate response, the following information will be requested:

1. The nature and condition of the emergency (i.e., is a release imminent, in process, or has it already occurred?).
2. The type of facility or radiological material involved in the emergency (e.g., a power reactor, nuclear material, etc.).
3. The location of the emergency and the nearest major city or town.
4. An estimate of the source term and isotope(s) involved and the chemical and physical form, if known.
5. The name and telephone number of a technical person from the reporting organization who is knowledgeable about the radiological situation.
6. The extent of knowledge about the release and distribution.
7. Public protective actions initiated.
8. The meteorological conditions at the time of the emergency.

3.2 Call-Up Procedures/Authorities

At the request of DHS/FEMA, the LFA and/or state, DHS/FEMA will authorize DOE to activate and deploy the offsite Federal radiological monitoring assistance assets. The primary Department of Energy assets supporting the FRMAC are the Radiological Assistance Program (RAP), the Consequence Management Official (CMO), the Consequence Management Planning Team (CMPT), the Consequence Management Home Team (CMHT), the Consequence Management Response Team (CRMT) Phases I and II (Appendix B), the National Atmospheric Release Advisory Capability (NARAC) (Appendix E), the Aerial Measuring System (AMS) (Appendix D), and the Radiation Emergency Assistance Center/Training Site (REAC/TS) teams (see Figure 1).

3.3 Phased Response Approach

To aid in ensuring a timely response to state and LFA requests for FRMAC services, NNSA/NSO has developed a phased response approach for deploying monitoring, sampling, analysis, and assessment resources. Resource deployment is divided into three phases with each phase incorporating both management and operational capabilities. Organizational structure is comparable

in each phase of the response. This will facilitate the integration of other Federal and state resources into the CM/FRMAC.

Throughout this document, the terms Consequence Management Response Team Phase I (CMRT I) and Consequence Management Response Team Phase II (CMRT II) are used. These terms refer exclusively to NNSA/NSO resources that have been organized in a two-tier system to support FRMAC and other consequence management responses. A description of each of the Consequence Management elements is outlined in paragraphs 3.6.3, 3.6.4, and 3.6.5.

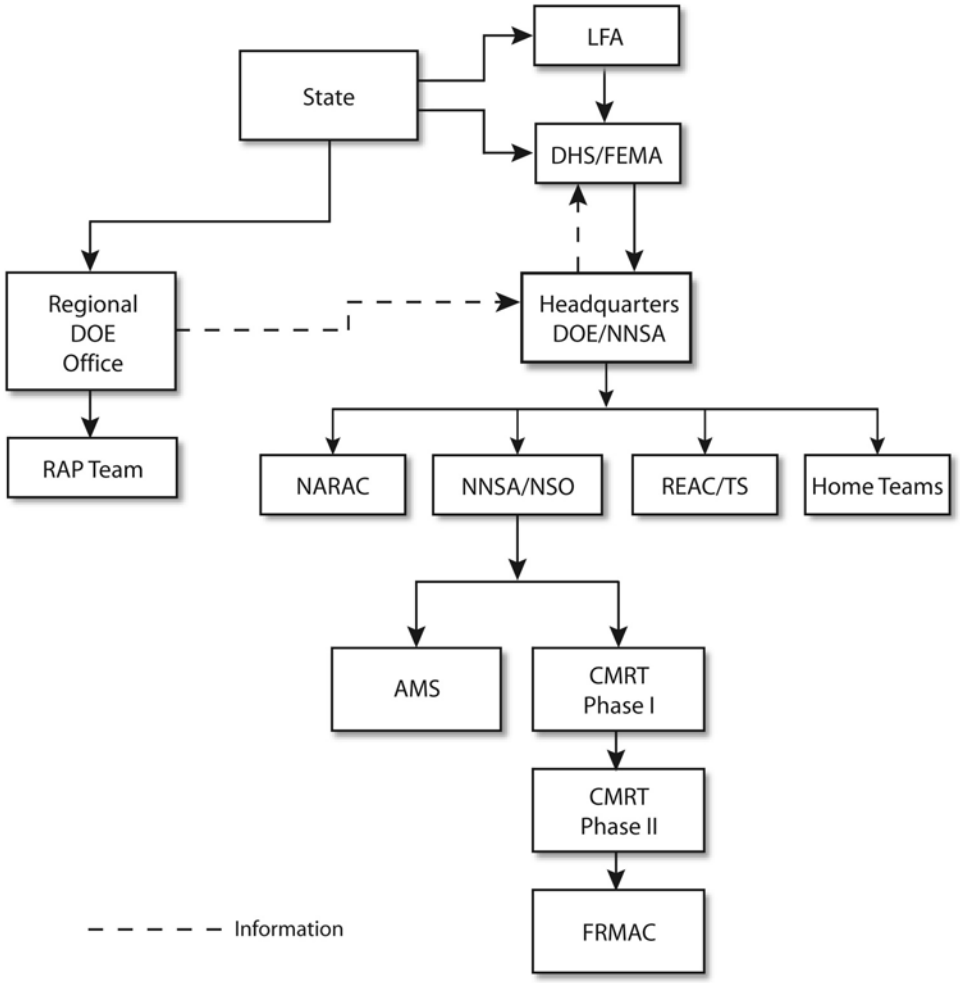


FIGURE 1. ***DOE ALERT, ACTIVATION, AND DEPLOYMENT***

3.4 FRMAC Activation Stages

When DHS/FEMA authorizes DOE/NNSA to deploy a CM/FRMAC response, the manager of NNSA/NSO, with concurrence of DOE/NNSA, designates a FRMAC Director and initiates CM/FRMAC deployment. The first team deployed to the field will be the on-duty CMRT I team as well as the on-duty EPA RERT Commander. The FRMAC Director and the EPA SO will accompany this team. Within hours, the CMRT II will then deploy to augment the CMRT I team, followed by

any additional FRMAC support and logistics personnel and equipment. This represents the NNSA/NSO's contribution to the CM/FRMAC. Each phase complements the team already at the site of the emergency response. As each team arrives in the field, they will be in constant contact with the team not yet deployed to ensure a prudent and reasonable follow-on response effort. Other Federal agencies that contribute to the CM/FRMAC response will coordinate with the FRMAC Director upon their arrival at the incident site.

3.5 Advance Party Meeting

After receiving notification to deploy, the NNSA/NSO will deploy CM assets to the emergency location. Planning elements of the CMRT will contact the local logistics officials for coordination of the CMRT I arrival. Elements of CMRT I will meet with the LFA and the state(s) upon arrival at an Advance Party Meeting to determine their requirements, define the appropriate level and composition of the consequence management response, and locate a suitable site to conduct operations. Refer to Appendix G for details regarding site-selection criteria and logistics requirements.

During the Advance Party meeting, members of the CMRT I will obtain the status of the emergency, public protective actions which have been initiated, available monitoring data, and any other pertinent information. In addition, CM/FRMAC, the LFA, and state liaisons will be identified and the FRMAC Monitoring and Sampling Strategy will be developed. This plan will reflect the state and LFA requirements and emphasize public safety. Appendix H contains the Advance Party Meeting Checklist (Chart H-1), followed by a sample of a FRMAC Monitoring Implementation Plan.

3.6 Primary DOE Assets Accessible to FRMAC, EPA, and Other Federal Agencies

The DOE and EPA provide significant radiation monitoring, analysis, and assessment equipment as well as highly skilled professionals. In addition, the CMRT element brings essential communications, logistics, photo/video, computer network, and mechanical/electrical support. Both institutional and mobile laboratories are available from DOE, EPA, and other Federal agencies. The Federal communities that comprise FRMAC may provide equipment and/or personnel to state, county, or local Emergency Operations Centers (EOCs) to augment communication processes with the CM/FRMAC, as requested. The following DOE assets will be activated and deployed, depending upon the real or potential impact of the emergency.

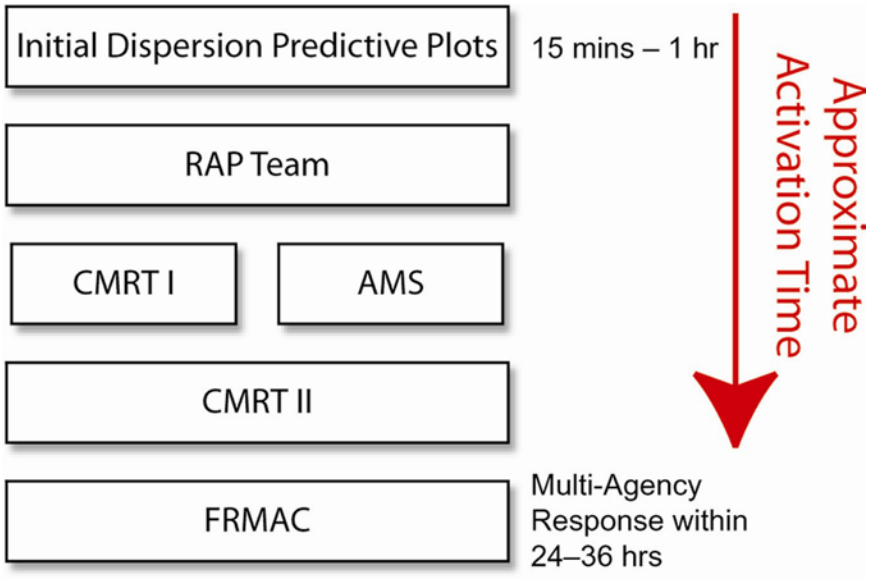


FIGURE 2. ***ACTIVATION SEQUENCE FOR VARIOUS DOE RELATED ASSETS ONCE AUTHORIZED***

3.6.1 National Atmospheric Release Advisory Capability (NARAC)

NARAC is a DOE asset supported from the National Atmospheric Release Advisory Center (NARAC), a facility located at Lawrence Livermore National Laboratory (LLNL) in Livermore, California. NARAC is a resource center for planning, real-time assessment, and detailed analysis of atmospheric releases involving nuclear, radiological, chemical, or biological material. To model atmospheric incidents, NARAC ingests over a million real-time meteorological observations a day from around the world. The Center can quickly project the downwind consequences from releases occurring from a few days in the past to a few days in the future. For future projections, NARAC receives NOAA and U.S. Navy weather forecast products, and can also run a high-resolution mesoscale weather forecast model over the area of interest.

The national center is staffed weekdays. Off hours, staff are available with a 1-hour recall. The DOE NARAC program can be activated through the RAP team, the DOE RCO, or DOE HQ. NARAC's primary products are calculated contour plots overlaid on a map of the emergency area. The minimum information needed to make a calculation is the time and location of the event. From this information NARAC can display the general downwind area of concern. If an estimate of the amount and type of material released (source term) is available, specific consequences can be estimated. A more detailed discussion of NARAC is outlined in Appendix E.

3.6.2 Sandia Hazard Response Capability (SHARC)

Sandia National Laboratories has developed modeling and simulation software to be used during radiological emergencies. This modeling software called Sandia Hazard Response Capability, or SHARC, is capable of simulating the conventional dispersal of radiological material, as well as the fallout from a nuclear explosion. It is compatible with NARAC, but is adapted to be useful on a

deployed mission scenario. Conventional dispersal of radiological material can be simulated in either an unmitigated mode, mitigated mode, or simultaneously in both modes. Nuclear dispersal of radioactive material can be simulated for one to three years. These dispersal simulations can be created simultaneously. This capability allows for the simulation of a range of possible yields and effects. This feature can be used to help bound the effect that could result from the detonation of a nuclear device. A more detailed discussion of SHARC capabilities is outlined in Appendix E.

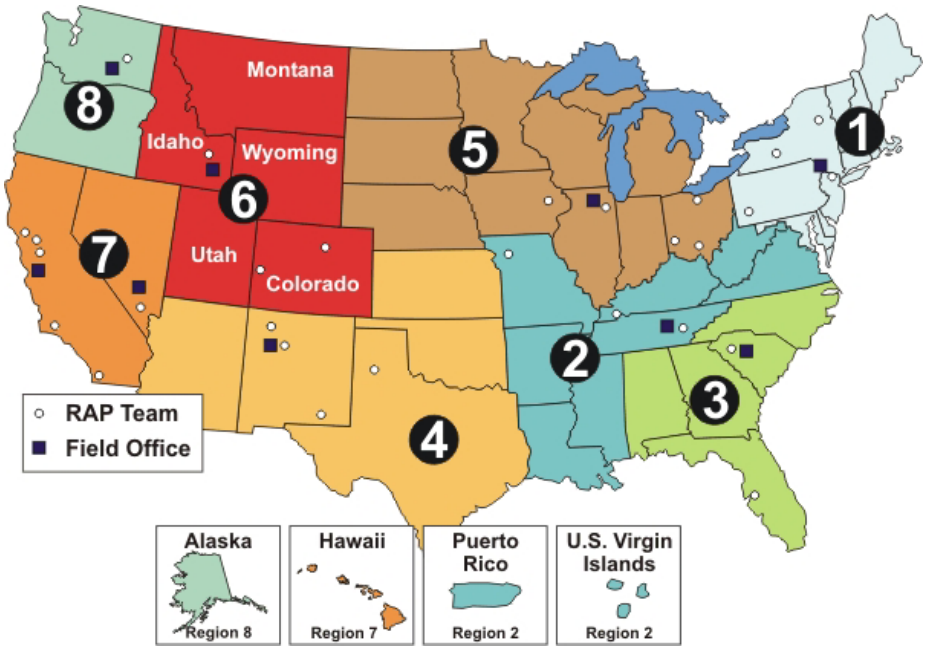
3.6.3 Radiological Assistance Program (RAP) Response

RAP is DOE's first responding resource in assessing an emergency situation and advising decision makers on what further steps could be taken to evaluate and minimize the hazards of a radiological emergency. RAP is capable of providing assistance for all types of radiological incidents. RAP support may be limited to advice given over the telephone or extend to sending skilled personnel and equipment to the accident scene to help identify and minimize any radiological hazards.

DOE implements RAP on a regional basis. DOE Regional Coordinating Offices (RCOs) have been established in each of the eight DOE Regions (see Figure 3) to provide radiological assistance, upon request, on a 24-hour basis. Requests for DOE radiological assistance should be directed to the appropriate DOE RCO or to DOE Headquarters.

Each RCO has a minimum of three RAP teams. A full RAP team has seven members, including a Federal Team Leader and a public information officer. The number of RAP personnel deployed will be tailored to meet the needs of the particular incident and may be as few as two people. The RAP team can be expected to be on-scene within four to six hours.

RAP has expertise in radiological assessment, area monitoring, air sampling, and exposure and contamination control. RAP's capabilities and resources include portable field radiation and contamination monitoring instrumentation (alpha, beta, gamma, and neutron), air sampling equipment, portable gamma spectroscopy systems, decontamination supplies, communications equipment, and personal protective gear. The teams, however, do not typically bring soil, water, and vegetation sampling capabilities for the initial response.



Region	Contact for Questions	24-Hour Telephone for Assistance
1	Regional Response Coordinator, U.S. Department of Energy 53 Bell Ave., Upton, NY 11973	(631) 344-2200
2	Regional Response Coordinator, U.S. Department of Energy P.O. Box 2001, Oak Ridge, TN 37831	(865) 576-1005
3	Regional Response Coordinator, U.S. Department of Energy P.O. Box A, Aiken, SC 29802	(803) 725-3333
4	Regional Response Coordinator, U.S. Department of Energy P.O. Box 5400, Albuquerque, NM 87135	(505) 845-4667
5	Regional Response Coordinator, U.S. Department of Energy 9800 S. Cass Ave., Argonne, IL 60439	(630) 252-5731
6	Regional Response Coordinator, U.S. Department of Energy 785 DOE Place, Idaho Falls, ID 83402	(208) 526-1515
7	Regional Response Coordinator, U.S. Department of Energy P.O. Box 808, Livermore, CA 94551	(925) 422-8951
8	Regional Response Coordinator, U.S. Department of Energy P.O. Box 550, Richland, WA 99352	(509) 373-3800

FIGURE 3. ***MAP OF DOE RAP REGIONS WITH FRMAC RESPONSE LOCATIONS***

3.6.4 Consequence Management Response Team Phase I (CMRT I)

The CMRT I is a rapid, 16-member initial response capability that may interface with the state(s), LFA, DoD officials, and the U.S. Department of State (DOS), in the case of a foreign deployment. This phase will serve as a quick response element to augment RAP in U.S. responses and will typically be the initial operational response element for foreign deployments. It also provides the core Command and Control for FRMAC contributions from other Federal agencies. The team will incorporate all the disciplines necessary to support operations but only on a limited scale. These disciplines include radiation monitoring, sampling, analysis, assessment, health and safety, and support and logistics functions. It is designed for quick response and rapid radiological data collection and assessment in order to provide early health effects advice and timely characterization of the radiological situation to the officials responsible for making and implementing protective actions for the public. In addition, CMRT I has the capability to provide escort services for emergency workers entering potentially contaminated areas for lifesaving and/or forensic operations. Each specific emergency may require a tailored response.

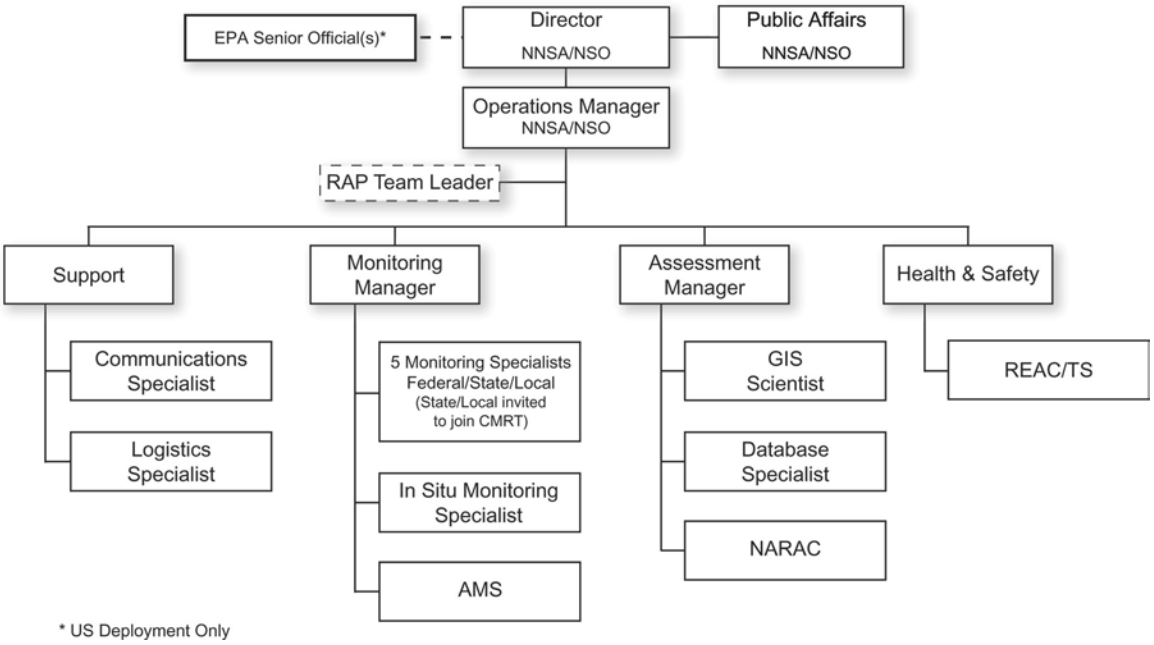


FIGURE 4. ***CMRT PHASE I***

3.6.5 Consequence Management Response Team Phase II (CMRT II)

CMRT II is designed to dispatch as an augmentation team to CMRT I. Upon field integration of CMRT I and CMRT II, the integrated group will be referred to as the CMRT II team. This integrated CMRT II will provide additional monitoring and assessment capability; allow for 24-hour emergency response activities; establish the data, voice, and fax links with NNSA/NSO and DOE/HQ; and establish Geographic Information System (GIS) support to the state and LFA. If appropriate, CMRT II will initiate preparation for the arrival of the FRMAC.

CMRT I and II are comprised of assets from both NNSA/NSO and DOE. Both provide the DOE with the consequence management capability to rapidly respond to any radiological emergency anywhere in the world. For deployments to remote areas, DOE has the resources and capability to establish technical operations centers in tents equipped with portable generator alternating current power, air conditioning/heating, satellite communications, radio communications, tables, chairs, and other support equipment. In addition, for the housing and care of the phased responders, tents, sleeping bags, and food can be provided for several days (sufficient meals ready to eat [MREs] for 100 people for three days). As with CMRT I, a specific emergency may require a tailored response.

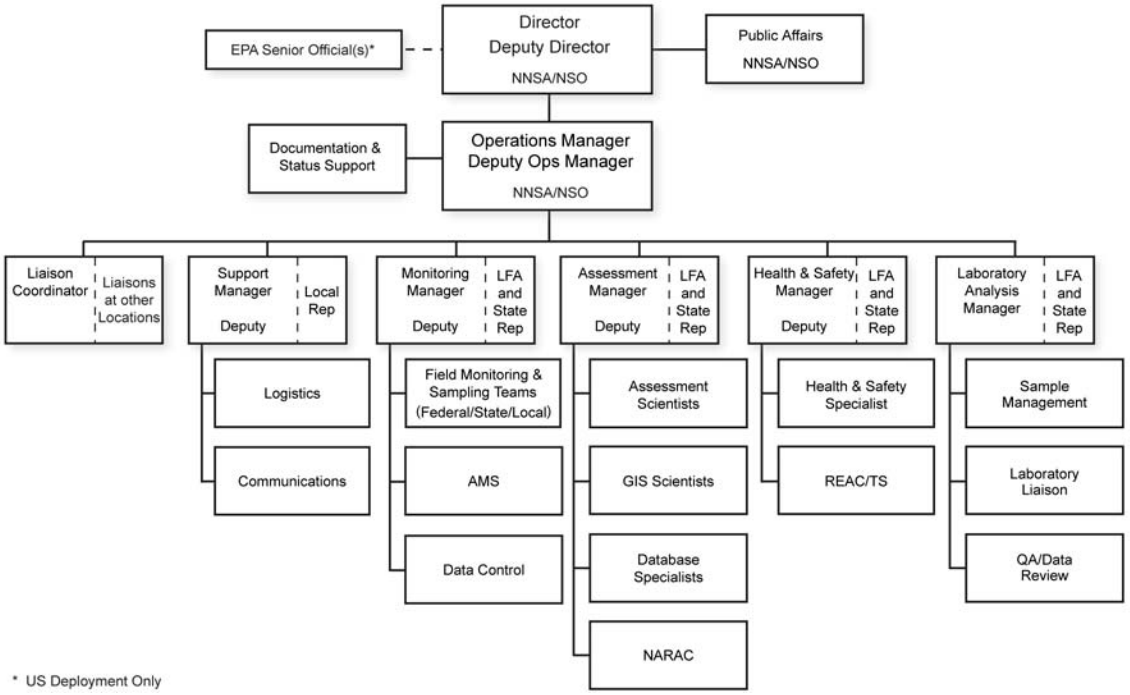


FIGURE 5. *CMRT* PHASE *II*

3.6.6 Aerial Measuring System (AMS)

The AMS helicopter and fixed-wing aircraft (Figure 6) are equipped to measure radioactive material deposited on the ground. The aircraft, permanently based at Nellis Air Force Base (AFB) in Las Vegas, Nevada, and at Andrews AFB near Washington, D.C., are key components in a response to an emergency involving dispersal of radioactive material over a large area.

The DOE/NNSA AMS program has an extensive collection of background radiological and photographic surveys of nuclear facilities in the United States. These survey results can be used as a baseline for evaluating releases of radioactivity from an accident or incident at one of the sites. A more detailed discussion of the AMS capabilities is given in Appendix D. The AMS fixed-wing response can occur in the same time frame as the CMRT I deployment.

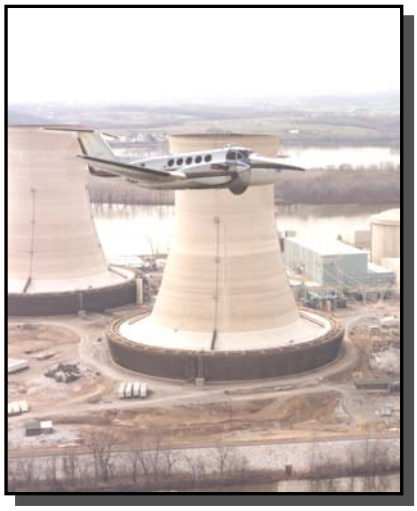


FIGURE 6. ***AMS PLATFORMS***

3.6.7 FRMAC

As defined in the FRERP, the FRMAC is the multi-federal agency radiological initial response organization created for responding to radiological emergencies impacting the United States. The number of required FRMAC personnel is closely correlated with the number of FRMAC field monitoring teams because the basic functions of the FRMAC depend on the number of monitoring teams collecting field monitoring data and environmental samples.

The FRMAC provides long-term monitoring and assessment during the initial phase and into the long-range monitoring response. The FRMAC is an interagency organization with representatives from various federal, state, and local radiological response organizations. It has the assets and the capabilities to provide additional logistical and communications support for the inter-agency organizations responding to a radiological incident.

3.6.8 EPA Radiological Emergency Response Team (RERT)

EPA's RERT is an independent, special team specified in the National Contingency Plan (NCP). It is a stand-alone unit capable of radiological response, but folds in to the FRMAC when that plan is activated. The RERT Commander becomes the Senior EPA Official in the FRMAC. This person is not the overall EPA Senior Official and may not be the EPA official representative to DHS during a terrorist activity.

3.6.9 Radiation Emergency Assistance Center/Training Site (REAC/TS)

The REAC/TS, located in Oak Ridge, Tennessee, provides direct support through deployable medical and health physics professionals. This team of medical experts specializes in the care and treatment of victims of radiation exposure and other types of physical injuries. The REAC/TS team

provides support to the CM/FRMAC workers and advice to other emergency centers and hospital professionals, as requested by the LFA and the state(s).

4.0 FIELD ACTIVITIES

4.1 Emergency Response Operations Structure

CM/FRMAC operations, by definition, support the state(s) and the LFA. The Advisory Team and Federal, state, and local representatives may choose to co-locate in the CM/FRMAC facility and carry out their own responsibilities related to, but separate from, the emergency response. It is expected that all activities will be coordinated through the CM/FRMAC; however, CM/FRMAC operations will not interfere with any obligation of other Federal, state, and local organizations to the emergency response. It is expected that the CM/FRMAC operational structure will convert to the Incident Command System in the near future.

CM/FRMAC is traditionally an "off-site" monitoring entity. However, in the case of terrorist activity or a transportation incident, the definition of the "site" might be vague. In such incidents, CM/FRMAC will work with first responders (local, state, and Federal) to negotiate a time when CM/FRMAC will direct all monitoring activities, including the "on-site" area. This would typically occur once the FBI no long controls the site as at a crime scene, or after first responders have removed victims. This negotiation might be as simple as the Incident Commander releasing the site to CM/FRMAC monitoring direction.

4.2 FRMAC Organization

The FRMAC organizational chart (Figure 7) shows the basic and most common operational configuration during a major radiological emergency. However, this chart may be modified during smaller, less significant radiological deployments. A description of key FRMAC positions and functions is given in Appendix I.

Figure 7 also shows participation by the LFA and the state(s), which are the customers of the CM/FRMAC. They play a major role in setting overall CM/FRMAC priorities and activities. Their representatives are the link to the FRMAC Director and staff. They are responsible for delivering requests from their organizations to the Director and staff for CM/FRMAC radiological products and services. Technical representatives from these organizations are located at key positions in the CM/FRMAC to help implement their organizations' requirements and priorities.

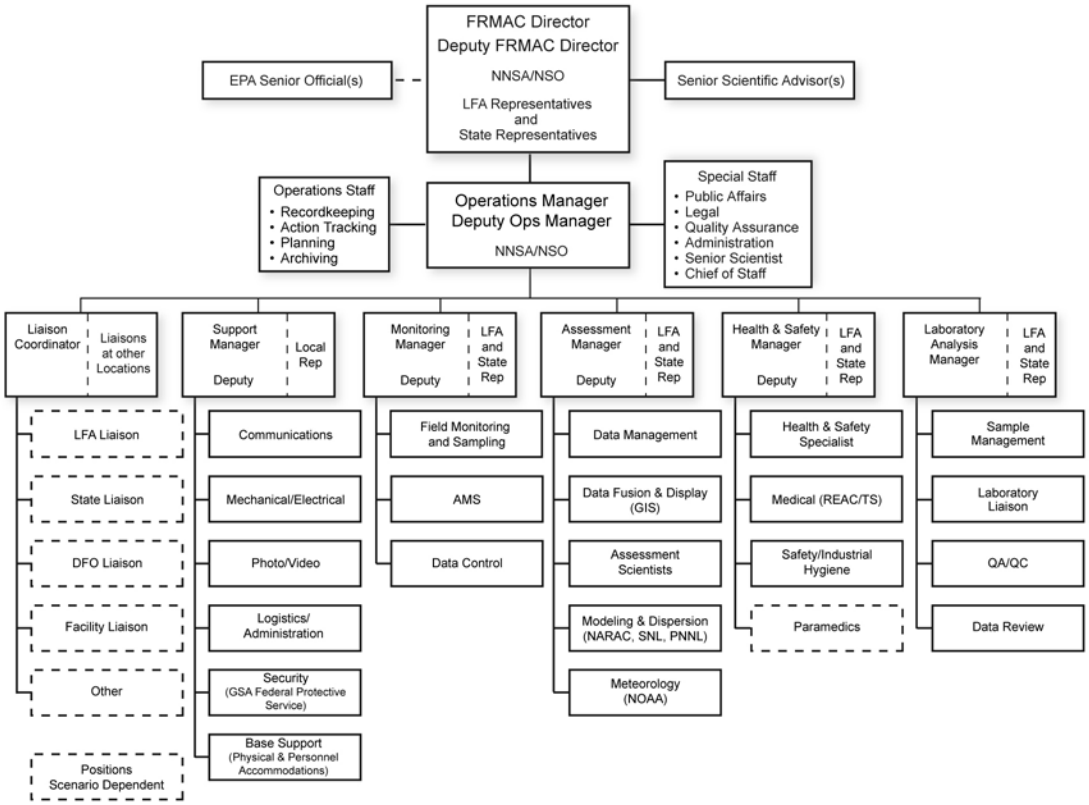


FIGURE 7. *FRMAC ORGANIZATION*

4.3 Field Operation

In the event of a radiological emergency, Federal agencies having various statutory responsibilities have agreed to coordinate their efforts at the scene under the umbrella of the FRERP. This cooperative effort will ensure the LFA and the state(s) that Federal technical assistance is fully supporting their efforts to protect the public and will provide the monitoring results in a working data center for immediate use by the LFA and state(s) decision makers. The Federal agencies do not relinquish their statutory responsibilities; however, mandated Federal cooperation ensures that each agency can obtain validated data critical to its specific responsibility.

Requests for information are received at the CM/FRMAC from the LFA and the state(s) and from other Federal agencies through the LFA. These requests will be prioritized and transmitted to the appropriate CM/FRMAC manager. Field monitoring teams or others will collect the requested data. The data will be reviewed by the appropriate staff, and the results will be evaluated, processed, and reported in the desired format. The data are provided, as soon as possible, simultaneously to the LFA and state(s) representatives.

The CM/FRMAC coordinates off-site, Federal, monitoring efforts and provides the following information without request and as needed.

- Plume and deposition predictions, as appropriate

- Air and ground concentrations
- Deposition patterns of isotopic concentrations, exposure rates, and dose projections
- Isotopic concentrations in environmental media
- Assurance of data quality
- Results of data collection, analysis, and evaluation
- Evaluations, assessments, and interpretation of data, as applicable
- Technical assistance to the LFA and state(s) decision-making officials, as requested
- Meteorological reports and weather forecasts

The CM/FRMAC database also contains the documentation to provide assurance of data quality and provides retrievable data of environmental contamination.

When the emergency phase is concluded, the source of radioactivity is determined to be stable, the environment has been characterized, and the participating Federal agencies have agreed to continue providing appropriate resources, DOE/NNSA will transfer the CM/FRMAC management to the EPA at a mutually agreeable time. Details on the transfer process are discussed in section 5.0 of this manual.

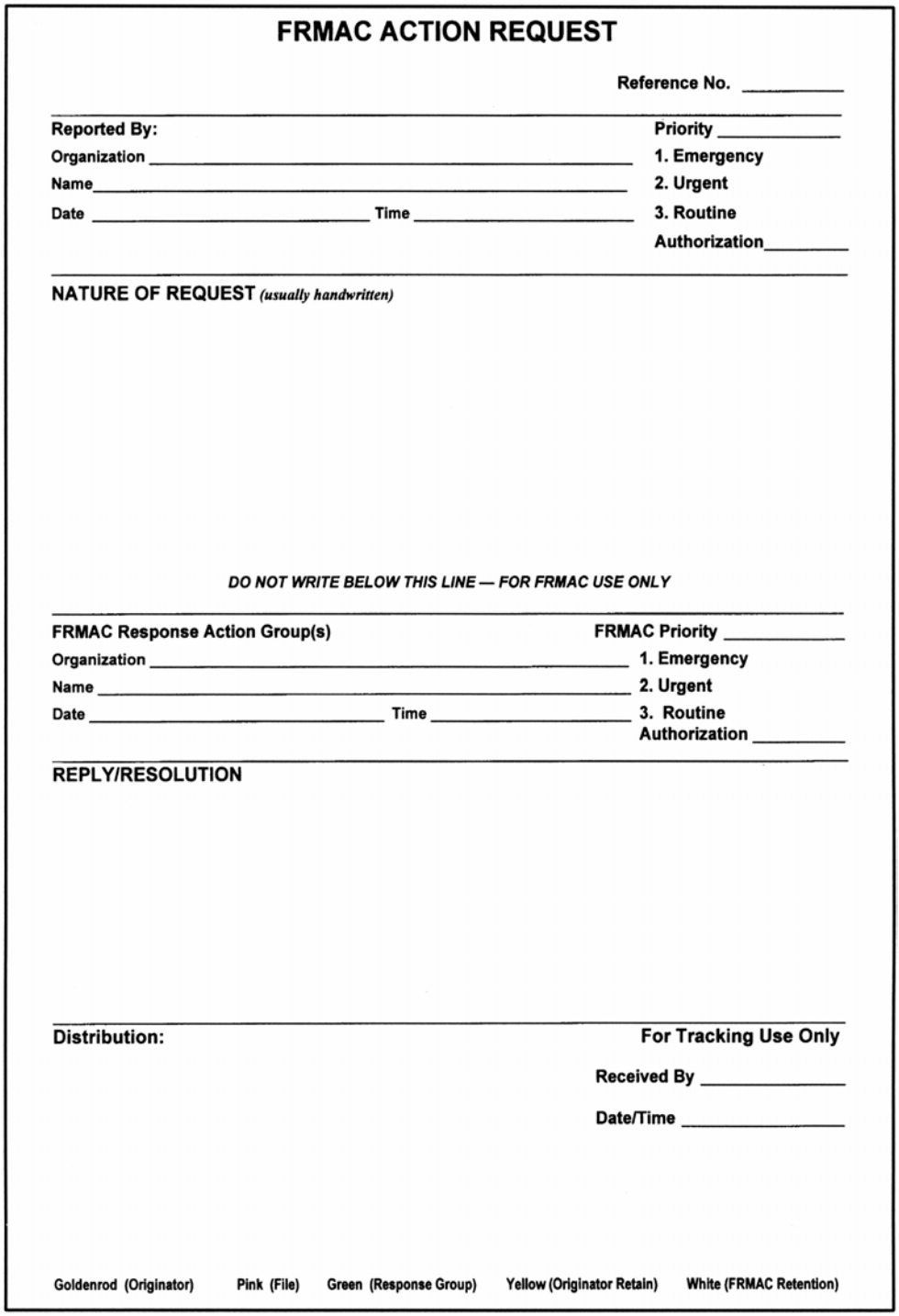
4.4 Setting CM/FRMAC Priorities

The CM/FRMAC reports monitoring data and assessments to the LFA and the state(s). In turn, the LFA and state(s) use this information to determine if new or additional protective actions are necessary. The highest priority for CM/FRMAC activities is protecting public health and safety. Therefore, setting priorities for monitoring and assessment activities will be dictated by the needs of the LFA and the state(s). There will be times, particularly in the early stages of a response, when the need for information and assistance may exceed CM/FRMAC resources. Priorities must then be established. The process for setting CM/FRMAC priorities when priorities exceed is described in this section.

4.4.1 FRMAC Action Requests

As shown on the FRMAC organization chart (Figure 7), the LFA and the state(s) and/or local representatives are collocated with the FRMAC Director. As the need for CM/FRMAC services arise, the LFA and the state(s) and/or local representatives to the FRMAC submit their requests to the CM/FRMAC using the FRMAC Action Request Form (Figure 8***).*** Examples of requests might include monitoring data from a specific location or projected dose estimates of the inside and outside areas of a specific building for one year. As requests are received, the FRMAC Director, Operations Manager, and LFA and state representatives review the new requests, the status of previous requests, and the status of current activities to determine and establish the new priorities for all requests. Additionally, CM/FRMAC liaisons established at other locations submit requests to the CM/FRMAC by using the Action Request Form.

FRMAC Action Request data are tracked and maintained in the Emergency Response Database System (ERDS). The program allows data to be easily retrieved and archived. All original Action Request Data Forms are maintained in a chronological logbook for historical purposes.



FRMAC ACTION REQUEST

Reference No. _____

Reported By: Priority _____
Organization _____ 1. Emergency
Name _____ 2. Urgent
Date _____ Time _____ 3. Routine
Authorization _____

NATURE OF REQUEST *(usually handwritten)*

DO NOT WRITE BELOW THIS LINE — FOR FRMAC USE ONLY

FRMAC Response Action Group(s) FRMAC Priority _____
Organization _____ 1. Emergency
Name _____ 2. Urgent
Date _____ Time _____ 3. Routine
Authorization _____

REPLY/RESOLUTION

Distribution: For Tracking Use Only
Received By _____
Date/Time _____

Goldenrod (Originator) Pink (File) Green (Response Group) Yellow (Originator Retain) White (FRMAC Retention)

FIGURE 8. *FRMAC ACTION REQUEST*

4.4.2 Setting Overall Priorities

As the need arises, the FRMAC Director will call meetings to review current and future priorities. The overall priorities will be determined by the FRMAC Director, Operations Manager, LFA representative(s), and state representative(s). This group will consider the overall CM/FRMAC activities and responsibilities as well as the immediate needs of the LFA and the state(s) to protect the public. The group will also decide, on a continuing basis, the overall priorities of the activities. However, implementing and managing CM/FRMAC resources will be determined by management. The group may, as needed, obtain input from the Senior Scientific Advisor (SSA), the Assessment Division manager, the Advisory Team, the Monitoring and Sampling Division, the Laboratory Analysis group, or others within the CM/FRMAC. This group will meet if the requests exceed CM/FRMAC resources. Otherwise, the Operations Manager and the Operations staff will handle the requests.

It is understood that the CM/FRMAC has overall responsibility for monitoring and assessing the off-site radiological situation without being specifically requested by the LFA or the state(s). Appendix C discusses CM/FRMAC products that the LFA and the state(s) will receive without specifically requesting them.

4.4.3 Implementation Plan for Priorities

When the overall CM/FRMAC priorities have been established, the Operations Manager will meet with appropriate division managers to draft the details for implementing priorities and determining impacts on current CM/FRMAC operations. The primary managers will be the Assessment Division Manager and the Monitoring Division Manager. If the impact on the CM/FRMAC is large, the SSA may also be involved. If priorities involve support functions or the health and safety of CM/FRMAC personnel, respective division managers would also be involved. This implementation plan would also contain a time line.

4.4.4 Approval of the Implementation Plan for Priorities

The Operations Manager will meet with the Director to approve the plan for implementing operational priorities. The FRMAC Director tasks the appropriate managers to implement priority activities. The Operations Manager and staff will track the activities through the CM/FRMAC and keep a status of the progress.

4.4.5 Technical Data Flow and Priorities

The CM/FRMAC's highest priority is to provide monitoring data and assessment results to the LFA, state(s), and local authorities. In the event that a release of radioactivity impacts a large area, the monitoring process will require a significant amount of time to acquire the data. Additional time will also be needed to assess the extent and magnitude of the impact. The goal is to replace the early model-based data used to project initial protective actions with actual monitoring results. A complete discussion of the type of dose assessment products that become available to decision

makers and the timeline of when the products become available may be found in the FRMAC Assessment Manual.

Initial monitoring will focus on protecting the public and determining the magnitude, direction, and extent of released radioactivity. (See Appendix H for priorities and strategies for initial monitoring, sampling, and analyzing activities.) Aerial surveys, which will be augmented by ground monitoring, will be utilized for these purposes. These first results are then used to direct a more detailed monitoring effort with inhabited areas receiving first priority unless otherwise directed by the LFA and state(s). Finally, the monitoring will be continued until all of the surrounding contaminated area is characterized and impacts assessed.

Figure 9 details the internal information flow of all CM/FRMAC environmental data. Provisions will be made in the information flow to promptly report any monitoring results that represent an immediate threat to public health. All raw data coming into the CM/FRMAC from CM/FRMAC teams are quickly reviewed, stamped as "raw data," and distributed to the LFA, state(s), local authorities, and all interested participants within the CM/FRMAC facility. Processed, evaluated, and summarized data from the Assessment group are approved by the FRMAC Director for external distribution. These evaluated technical data are distributed formally to the LFA and state(s) simultaneously.

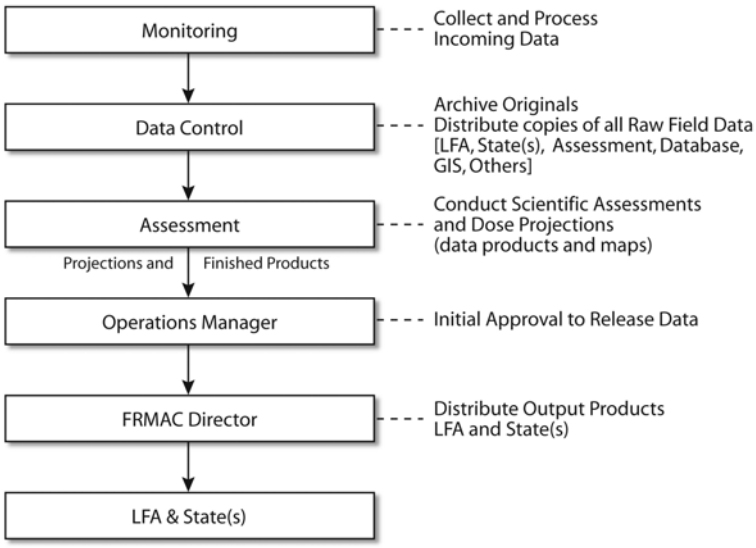


FIGURE 9. ***FRMAC RADIOLOGICAL DATA INFORMATION FLOW***

4.5 Interfacing

4.5.1 U.S. Department of Homeland Security (DHS)

The I-NRP establishes the Homeland Security Operations Center at DHS headquarters to integrate and provide overall steady-state threat monitoring and situational awareness for domestic incident management on a 24/7 basis. DHS and other Federal agencies listed in the INRP provide representatives at the HSOC.

4.5.2 U.S. Department of Energy (DOE)

During the emergency phase when DOE is managing the CM/FRMAC, the CM/FRMAC will keep NNSA/NSO, the affected DOE Region, and DOE/HQ informed of the status of the emergency, the utilization of DOE/NNSA assets, status of activities, and needs for additional resources, if applicable. Radiological data and results, if requested, will be transmitted to NNSA/NSO, the affected DOE Region, and/or DOE/HQ, when approved for distribution by the LFA.

4.5.3 Lead Federal Agency (LFA)

The FRMAC Director will initiate discussions with the LFA staff as soon as technical assistance is requested. These discussions will address the conditions and status of the emergency and possible off-site consequences. Once the CM/FRMAC is established, the LFA will provide appropriate status updates to the FRMAC through an LFA representative located at the CM/FRMAC. The representative will be the primary channel for transmitting the LFA off-site monitoring and assessment requirements to the CM/FRMAC and the distribution of the CM/FRMAC's assessed data to the LFA.

4.5.4 State(s) and Local Agencies

To facilitate the requests from the state(s) to the FRMAC and the flow of assessed data from the FRMAC to the state(s), liaison personnel will be exchanged. Also, state and local advisors are invited to be incorporated into the FRMAC Director's senior staff as well as the Monitoring, Assessment, Health and Safety, Laboratory Analysis and Support groups. Because of their local and professional knowledge, advisors provide valuable assistance in the efficient and optimal operation of the CM/FRMAC in meeting the requirements of the state(s).

Due to the nature of work and information exchange among the CM/FRMAC elements, designees from the surrounding communities, tribal, county, and local governmental officials, as well as emergency service liaison personnel may be represented in the CM/FRMAC. Also, if requested, the CM/FRMAC will provide liaison representatives to tribal, county, and local emergency operations centers.

4.5.5 U.S. Environmental Protection Agency (EPA)

The EPA will be notified if a CM/FRMAC has been requested for a radiological emergency. The EPA provides a senior representative in the CM/FRMAC to ensure that data collected and recorded in the data center provide the necessary information for long-term re-entry and recovery considerations and can be used as a basis for developing a long-term monitoring plan. Once the emergency is stabilized and at an agreeable time, the EPA Senior Official will assume management of the CM/FRMAC from DOE/NNSA.

4.5.6 Other Agencies

As needed and as requested by the LFA, other signatory agencies to the FRERP are provided space and support to integrate their activities into the FRMAC operations. Many agencies provide key professionals in technical areas of importance to the FRMAC. Included are specialists in food crops, milk production, water supplies, and critical industries. As full participants in the FRMAC, these agencies become part of the monitoring and assessment technical teams to ensure that their areas of concern are addressed. These federal agencies may include the EPA, NRC, DoD, USDA, HHS, National Oceanic and Atmospheric Administration (NOAA), and others as needed. The responsible facility operator may also be represented at the FRMAC to provide updates on facility status.

5.0 TRANSFER OF FRMAC MANAGEMENT FROM DOE/NNSA TO EPA

5.1 Introduction

The FRERP states that DOE/NNSA will transfer responsibility for managing the FRMAC to EPA at a mutually agreeable time after consulting with the LFA and state(s). This section discusses the processes and conditions by which this transfer will take place.

5.2 Transfer Requirements

The DOE/NNSA FRMAC Director will work closely with the Senior EPA Official to facilitate a smooth transfer of the Federal radiological monitoring and assessment coordination responsibility to EPA at a mutually agreeable time and after consultation with their respective headquarters offices, the states, and the LFA. Although it is difficult to specify in advance when the transfer of this coordination responsibility would occur, certain conditions are intended to be met prior to this transfer. These conditions include the following:

1. The immediate emergency condition is stabilized.
2. Off-site release of radioactive material has ceased, and there is little or no potential for further unintentional off-site releases. This will be verified by the Senior EPA Official with the LFA, the FRMAC Director, and the party responsible for the incident (e.g., the utility if a nuclear power plant accident).
3. The off-site radiological conditions have been characterized and the immediate consequences have been addressed. The EPA Dose Assessment Manager will verify with the DOE FRMAC Assessment Manager that all data has been documented according to FRMAC archival procedures and this record is presented to and is satisfactory with EPA.
4. An initial or draft long-range monitoring plan has been developed in conjunction with the affected states and appropriate Federal agencies. Development of the long-range plan would begin during the later portion of the emergency phase response.
5. The EPA has received adequate assurances from the other Federal agencies that they will commit the required resources, personnel, and funds for the duration of the Federal response.

After these conditions are met and a formal document is signed, the EPA will assume the Federal agency responsibility for coordinating the intermediate and long-term off-site radiological monitoring, sampling, and assessment activities. When this occurs, DOE and other Federal agencies will continue to commit the equipment, personnel, and funds for the duration of the Federal response effort as necessary.

After transfer, the EPA FRMAC Director will work with whatever cleanup group (Site Restoration Working Group, Decontamination Committee, etc.) is in charge of overall cleanup. The FRMAC will continue to provide monitoring data for cleanups as well as keep re-assessing problem areas.

In time, the EPA-led FRMAC will scale down into a smaller EPA and EPA-contractor entity. This will include relocating out of the original FRMAC location and establishing whatever near-site facility is necessary to accomplish the monitoring mission. EPA plans to terminate its near-site monitoring effort with the concurrence of the EPA Science Advisory Board. The organization of the post-emergency FRMAC is presented in Figure 10.

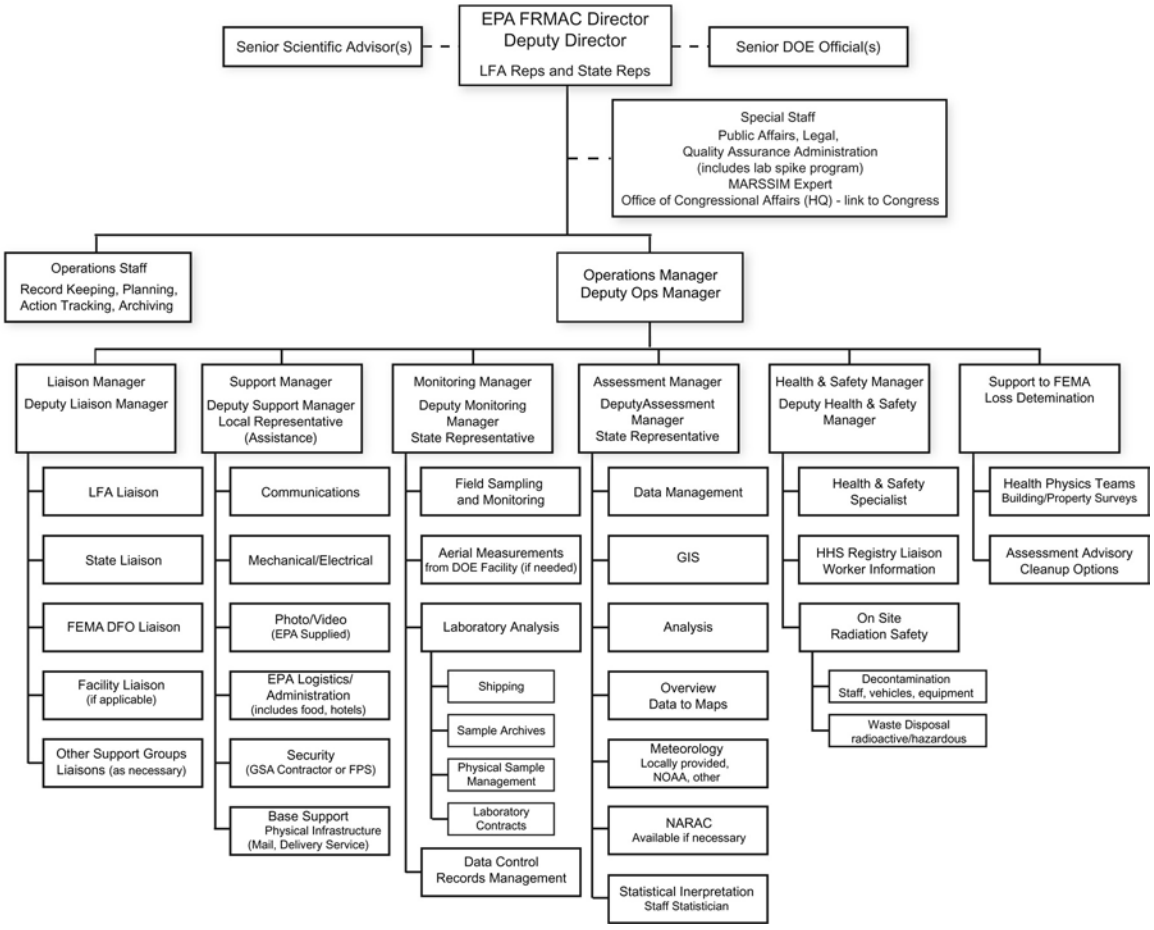


FIGURE 10. ***POST EMERGENCY FRMAC ORGANIZATION (SET UP AFTER TRANSFER)***

APPENDIX A

AGENCIES IDENTIFIED FOR RADIOLOGICAL RESPONSE IN THE INITIAL NATIONAL RESPONSE PLAN (I-NRP) AND THE FEDERAL RADIOLOGICAL EMERGENCY RESPONSE PLAN (FRERP)

A.1 GENERAL SERVICES ADMINISTRATION (GSA)

GSA is responsible to direct, coordinate, and provide logistical support of other Federal agencies. GSA provides acquisition and procurement of floor space, telecommunications and automated data processing services, transportation, supplies, equipment, material; it also provides specified logistical services that exceed the capabilities of other Federal agencies. GSA also provides contracted advisory and support services to Federal agencies and provides security services on Federal property leased by or under the control of GSA.

A.2 NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

The role of NASA in a Federal response will depend on the circumstances of the emergency. NASA will be the LFA and will coordinate the initial response and support of other agencies as agreed to in specific interagency agreements when the launch vehicle or payload carrying the nuclear source is a NASA responsibility. NASA has launch facilities and the ability to provide launch vehicle and space craft telemetry data through its tracking and data network. NASA also has the capability to provide limited radiological monitoring and emergency response from its field centers in Florida, Alabama, Maryland, Virginia, Ohio, Texas, and California.

A.3 NATIONAL COMMUNICATIONS SYSTEM (NCS)

The NCS is responsible for adequate telecommunications support to the Federal response and recovery operations. NCS can provide the expertise and authority to coordinate the communications for the Federal response and to assist appropriate State agencies in meeting their communications requirements.

A.4 U.S. DEPARTMENT OF AGRICULTURE (USDA)

Inspect meat and meat products, poultry and poultry products, and egg products identified for interstate and foreign commerce. Assist HHS in monitoring the production, processing, storage and distribution of food. Collect agricultural samples within the Ingestion Exposure Pathway Emergency Planning Zone. Assist in the determination of impact of the incident on agriculture.

A.5 U.S. DEPARTMENT OF COMMERCE (DOC)

Prepare operational weather forecasts tailored to support activities. Prepare predictions of plume trajectories, dispersion, and deposition. Archive meteorological data from national systems applicable to the monitoring and assessment of the response. Ensure the safety of marine fishery products. Provide assistance and reference material for calibrating radiological instruments.

A.6 U.S. DEPARTMENT OF DEFENSE (DOD)

Provide radiological resources to include trained response personnel, specialized radiation instruments, mobile instrument calibration, repair capabilities, and expertise in site remediation. Perform special sampling of airborne contamination on request.

A.7 U.S. DEPARTMENT OF ENERGY (DOE)

The role of the DOE is discussed in detail throughout this document.

A.8 U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES (HHS)

In conjunction with the USDA, inspects production, processing, storage, and distribution facilities for human food and animal feeds, which may be used in interstate commerce, to assure protection of the public health. Collect samples of agricultural products to monitor and assess the extent of contamination as a basis for recommending or implementing PAGs.

A.9 U.S. DEPARTMENT OF HOMELAND SECURITY (DHS)

Responsible for the National Homeland Security Operations Center (HSOC) for operational communications and information regarding domestic incident management.

A.9.1 DHS/Federal Emergency Management Agency (FEMA)

FEMA will provide personnel who are experienced in disaster assistance to establish and operate the Disaster Field Office; public information officials to coordinate public information activities; personnel to coordinate reporting to the White House and liaison with the Congress; and personnel experienced in information support for the Federal response. FEMA will coordinate assistance to state and local governments among the Federal agencies; coordinate Federal agency response activities; except those relating to CM/FRMAC, and coordinate these with the activities of the LFA; and work with the LFA to coordinate the dissemination of public information concerning Federal emergency response activities.

A.10 U.S. Department of Housing and Urban Development (HUD)

Review and report on available housing for disaster victims and displaced persons. Assist in planning for and placing homeless victims in available housing. Provide staff to support emergency housing within available resources. Provide housing assistance and advisory personnel.

A.11 U.S. Department of the Interior (DOI)

Advise and assist in assessing impacts to economic, social, and political issues relating to natural resources, including fish and wildlife, subsistence uses, public lands, Indian Tribal lands, land reclamation, mining, minerals, and water resources.

A.12 U.S. Department of the Justice (DOJ)

Coordinates the Federal response to acts of terrorism in the United States and U.S. territories. Within the DOJ, the Federal Bureau of Investigation (FBI) will manage the law enforcement aspect of the Federal response to such incidents. The FBI will coordinate all law enforcement operations, including intelligence gathering, hostage negotiations, and tactical operations.

A.13 U.S. Department of State (DOS)

Is responsible for the conduct of relations between the U.S. Government and other governments and international organizations and for the protection of U.S. interests and citizens abroad. In a domestic radiological incident, with potential trans-boundary consequences, DOS will coordinate all contacts with foreign governments and agencies, except where bilateral agreements provide for direct exchange of information.

A.14 U.S. Department of Transportation (DOT)

Can assist Federal, state, and local governments with emergency transportation needs and contribute to the response by assisting with the control and protection of transportation near the area of emergency.

A.15 U.S. Department of Veterans Affairs (VA)

Can assist other Federal agencies, state and local governments, and individuals in an emergency by providing immediate and long-term medical care, including management of radiation trauma, as well as first aid, at its facilities or elsewhere.

A.16 U.S. Environment Protection Agency (EPA)

EPA's On-Scene Coordinators (OSCs), their contractors, and the special teams under the NCP are available and trained to respond to incidents involving hazardous substances or any pollutants or contaminants that may present an imminent and substantial danger to the public health or welfare of the United States. Each of the EPA's ten regional offices maintains its own response capabilities and contractors. Special Teams available to the EPA OSC under the NCP include EPA's Environmental Response Team (ERT), which has expertise in treatment, technology, biology, chemistry, hydrology, geology, and engineering. The ERT can provide access to special decontamination equipment for chemical releases and advice to the OSC in hazard evaluation; risk assessment; multimedia sampling and analysis program; on-site safety, including the development and implementation of plans; cleanup techniques and priorities; water supply decontamination and protection; application of dispersants; environmental assessment; degree of cleanup required; and disposal of contaminated material.

A.17 U.S. Nuclear Regulatory Commission (NRC)

Provide assistance in Federal radiological monitoring and assessment activities during incidents. Provide radiation monitoring results received from NRC-licensed facilities.

The above descriptions are summaries of the response missions and capabilities and resources of the signatory Agencies. A full discussion can be found in the Federal Radiological Emergency Response Plan (FRERP).

APPENDIX B

OTHER CONSEQUENCE MANAGEMENT ELEMENTS

B.1 CONSEQUENCE MANAGEMENT OFFICIAL (CMO)

The Consequence Management Official (CMO) is an NNSA/NSO representative with expertise in defining federal requirements and providing guidance on Consequence Management responses and activities including knowledge of DOE/NNSA resources, protective measures and radiation monitoring, assessment and analysis.

The CMO would typically serve as the FRMAC Director and is responsible for providing advice and guidance on all consequence management functions to the Senior Energy Official (SEO), local and state officials, and representatives from lead federal agencies, and representatives from foreign nations and may function as either the SEO or Deputy SEO. When assigned, the CMO will typically deploy as part of the Domestic Emergency Support Team (DEST) or Foreign Emergency Support Team (FEST). The CMO will be prepared to deploy within two hours of notification. The CMO can be available either via communications or deployment, in advance of requesting other assets, to provide advice in the areas listed above.

B.2 CONSEQUENCE MANAGEMENT PLANNING TEAM (CMPT)

The CMPT will deploy in those instances where planning is considered the driving factor (i.e., during the crisis phase of an incident). The team is comprised of scientists and operational planners with specific expertise in effects modeling, radiation monitoring and assessment, protective action guides, logistics planning, and military plans development and is designed to deploy anywhere in the world. The CMPT will typically integrate with other federal agencies in developing a consequence management plan. Direction of the CMPT is provided by the CMO.

This team is designed to support 24-hour operations, but the number of personnel can be reduced based on the response requirements. The CMPT will be prepared to deploy within four hours of notification and will typically travel via commercial air.

B.3 CONSEQUENCE MANAGEMENT HOME TEAM (CMHT)

When requested, or when directed to deploy any of the CM national assets, home team nodes will be established at RSL-NV, SNL, and NARAC. The home teams, NNSA/NSO EOC, DOE/HQ, and other affected sites will be linked via the Emergency Communications Network (ECN). Field elements will be tied into the ECN via field communications capabilities. Home teams will be prepared to provide logistical support, develop initial effects predictions and assessments of field data, and expert advice while field elements are in the deployment phase. This assessed data can then be distributed securely over the ECN to other sites and to deployed elements. Once field

elements are operational, the home teams will continue to provide support in the form of advice and data analysis, until authorized to stand down by DOE/NNSA. Disciplines from the CMPT will be replicated on the home teams to ensure consistency of data.

The CMHT nodes will be prepared to stand-up within an hour of notification during normal working hours and within two hours during non-working hours.

APPENDIX C

FRMAC DATA OUTPUT PRODUCTS

Without a specific request for information, the Lead Federal Agency (LFA), state(s), and local authorities can expect that the Federal Radiological Monitoring and Assessment Center (FRMAC) will work toward producing the generic products listed in the following sections. The majority of these products will be produced within the FRMAC by the Assessment group. They will be presented with some perspective on the radiological situation, as known at the time, in a form readily understandable to managers and decision makers.

C.1 PLUME DISPERSION AND DOSE PROJECTIONS

The Lawrence Livermore National Laboratory's Atmospheric Release Advisory Capability (NARAC) or Sandia National Laboratories/New Mexico Consequence Predictions group will provide plume, deposition, and dose projection modeling (Sample plots are shown in Figures C-1 through C-4). Signatory agencies to the Federal Radiological Emergency Response Plan (FRERP), i.e., U.S. Department of Commerce (DOC) and National Oceanic and Atmospheric Administration, will provide a wide variety of meteorological data and forecasts. NARAC predictions will supplement those made by the facility operator, LFA, state(s), DOC, and other federal agencies. Projections will be revised as verified field measurement data become available.

C.2 AERIAL SURVEY DATA

The DOE/NNSA's first Aerial Measuring System (AMS) mission would likely be performed in a serpentine pattern to cover the entire deposition area expeditiously (Sample deposition map shown in Appendix D, Figure D-2). The results of this first mission are expected to identify the extent of the measurable contamination in both width and length, the major isotopes contributing to the aerial results, and an estimated level of contamination (exposure rates and/or isotope concentrations).

Later missions will involve more detailed surveys. Each aerial mission is expected to take from two to three hours, with the results available one to three hours after a mission is completed. These results will be reviewed and issued to the LFA, state(s), and local authorities as soon as possible after the completion of each survey mission. AMS flights may involve the use of both helicopter and fixed-wing aircraft utilizing large sodium iodide gamma detectors. Sensitivities are such that small changes in background can be detected (less than 1 microroentgen per hour).

C.3 REVIEWED RAW DATA

Ground-based radiation data (including exposure rates, sampling results, and isotopic concentrations of deposited activity) will be reviewed by the Monitoring group, stamped "raw data," and provided

to the LFA, state(s), and local authorities within the CM/FRMAC facilities. Specific data points (required by the LFA, state(s), or other agencies) may be needed, particularly in the initial stages of an emergency when complete data are unavailable. These reviewed raw data will be screened for complete information such as times, locations, units, exponents, and instruments used. The review will also provide some assurance of consistency within the product since it is reviewed against current knowledge of the overall radiological situation. Reviewed raw data may also include data from samples of water, air particulates and reactive gases, soil, vegetation, food products, and any other sample media consistent with potential health hazards.

C.4 SUMMARIZED DATA

Environmental radiation data from field teams and laboratories will be entered into a database for both short-term and long-term storage and retrieval. As required, the data can be condensed and summarized to show the radiation situation in specific areas or to correlate sample media from different types of surveys. For example, a summarized data sheet could be generated to show all of the external exposure rate data taken in certain sectors, districts, or population areas over a given time period.

C.5 EXPOSURE RATE AND/OR CONTAMINATION CONTOURS

The CM/FRMAC provides radiation contours showing where the contamination is located and the associated radiation levels. Initially, projections of radiation patterns from radiological dispersion models are likely to be the only ones available. As environmental surveys are conducted, these contours will be refined or changed to be consistent with data from actual measurements. It is anticipated that contamination contours will be updated every few hours to represent the latest information received in the CM/FRMAC. The contour levels may be in exposure rates or isotopic concentrations, depending on the type of emergency and preferences of the LFA, state(s), and local authorities.

C.6 DOSE PROJECTIONS FROM ACTUAL MEASUREMENTS

Once enough data points are available, more realistic projections of doses to individuals and/or groups of individuals can be produced. The contour levels will include those applicable to the PAGs, as well as any other levels of interest. For example, it may be appropriate to produce contours of the projected four-day, one-month, first-year, second-year, and 50-year whole-body dose equivalent from external and internal radiation (total effective dose equivalent) for outdoor locations and/or for sheltered locations. A variety of assumptions of modifying factors may be included in these dose projections including, but not limited to, weathering, re-suspension, structure shielding, and occupancy rates. The CM/FRMAC dose projections will be as realistic as possible using reasonable assumptions and transfer values consistent with the uncertainties involved. Such assumptions will be documented or their sources referenced and included with the assessments.

C.7 FRMAC DATA CENTER

All of the environmental radiological data acquired by or furnished to the CM/FRMAC will be stored in the FRMAC Data Center. It will be comprehensive because it is intended to include every off-site environmental radiological data point. Every data point acquired by CM/FRMAC will be traced to an individual instrument, survey team, calibration, and procedure. The long-term design objectives of the Data Center are to (1) build a comprehensive compilation of all environmental radiological data for long-term retention and use by the U.S Environmental Protection Agency, the LFA, state(s), and local authorities and (2) archive all information to reconstruct knowledge of the radiological situation some time in the future.

C.8 GEOGRAPHIC INFORMATION SYSTEM (GIS) PRODUCTS

The GIS is a computerized database management system which provides for the capture, storage, retrieval, analysis, and display of spatial (defined by location) data. By having layers of information displayed on a computer screen and/or map, a person can see the relationship of one piece of information to another. The GIS database also allows for attributes of a given piece of data to be easily referenced. For example, a specific school can be located on a map and applicable information about that school can be extracted using the database. The GIS can also calculate areas of interest. For example, a land-use data layer can be overlaid onto a radiation plot to calculate the area of a given type of land use that lies within a certain radiation zone.

Layers of information within the GIS may include: (1) geographic base data, (2) administrative data, (3) emergency response data, (4) land cover/land use, (5) critical industries, (6) radiation data, (7) dispersion model output, and (8) image data. These GIS layers may include locations of evacuation routes, police and fire stations, hospitals and clinics, operations centers, shelters, and institutions (schools, prisons, and nursing homes). Radiation data could include baseline background levels, environmental thermoluminescent dosimeter locations, continuous location of survey teams, AMS data, location of measurements and samples by type, exposure rate contours, integrated one-year dose projection contours, and isotopic concentration contours by dominant isotope.

C.9 TAILORED FORMAT FOR USERS

The FRMAC will present the off-site environmental radiological data to the LFA, state(s), and local authorities in a recognizable and usable format and in a manner understandable by managers and decision makers. Whenever possible, there will be presentation-quality graphics (both hard copies and transparencies [MS PowerPoint]) that summarize data and impacts. Discrete data will be prepared in a clear, concise form, organized specifically for a particular purpose. Radiation levels in commonly used units and/or in values relative to recognizable PAG levels will be used. Where possible, plotted or contoured radiation levels will be displayed in standard FRMAC color schemes. Information transmitted by fax, GIS, or still video will be produced in an easily readable and concise format with sufficient information to properly present the required data. Whenever possible, the provided information will be tailored to meet the purposes of the intended users.

EXAMPLES OF GIS PRODUCTS

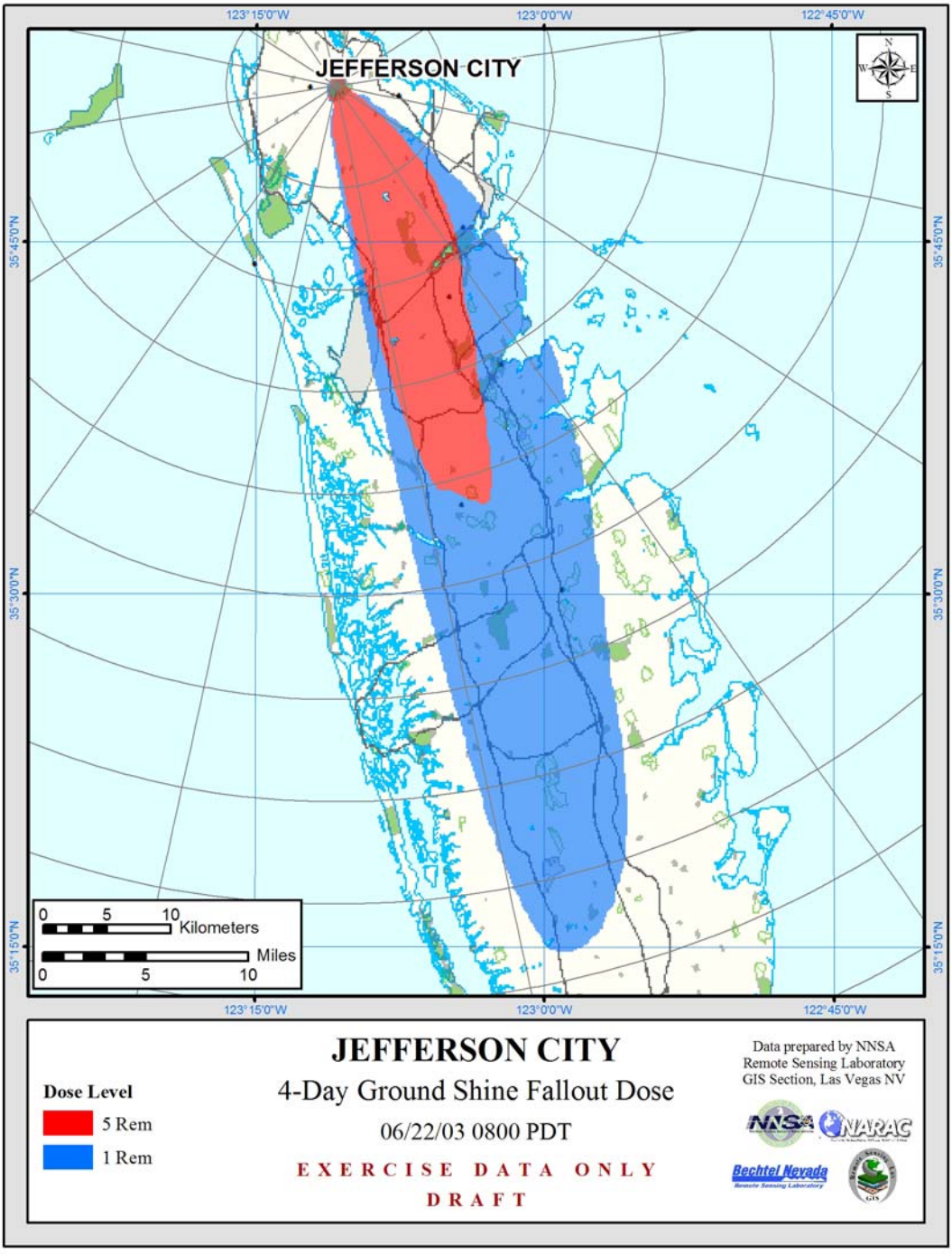


FIGURE C-1. ***PAG ZONE MAP***

Evacuation PAG Zone map indicates regions exceeding EPA's Early Phase PAG for both "normal" and "immobile population." Sheltering region would be shown if potentially effective.

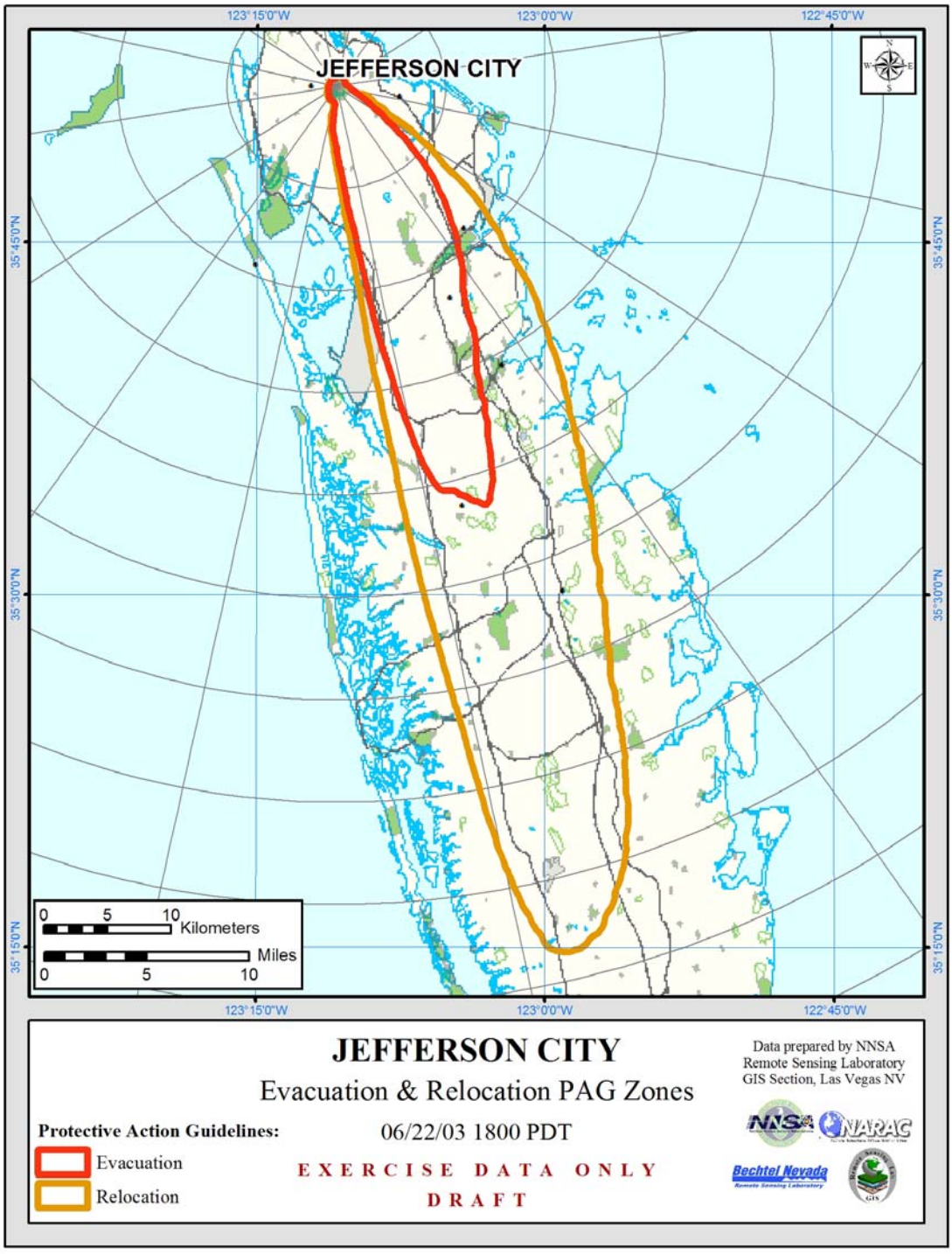


FIGURE C-2. *RELOCATION PAG ZONE MAP*

Relocation PAG Zone map indicates regions exceeding EPA's Intermediate Phase Relocation PAG and Long Term Objectives.

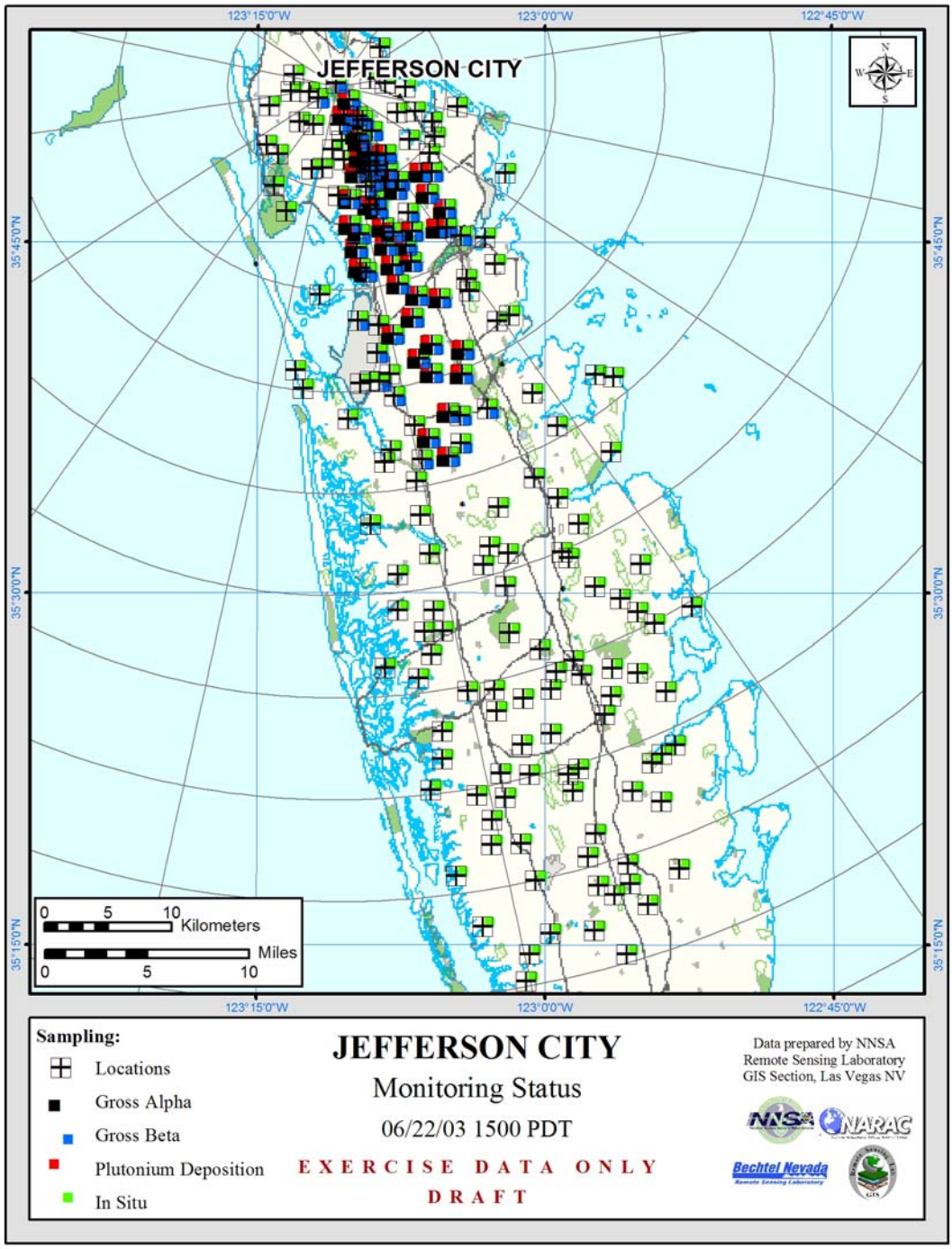


FIGURE C-3. ***MONITORING AND SAMPLING STATUS MAP***

Summary of measurement types and sample types at each location visited to date. This Monitoring Status Map only presents four types of measurements. Additional maps are used if more than four types must be presented.

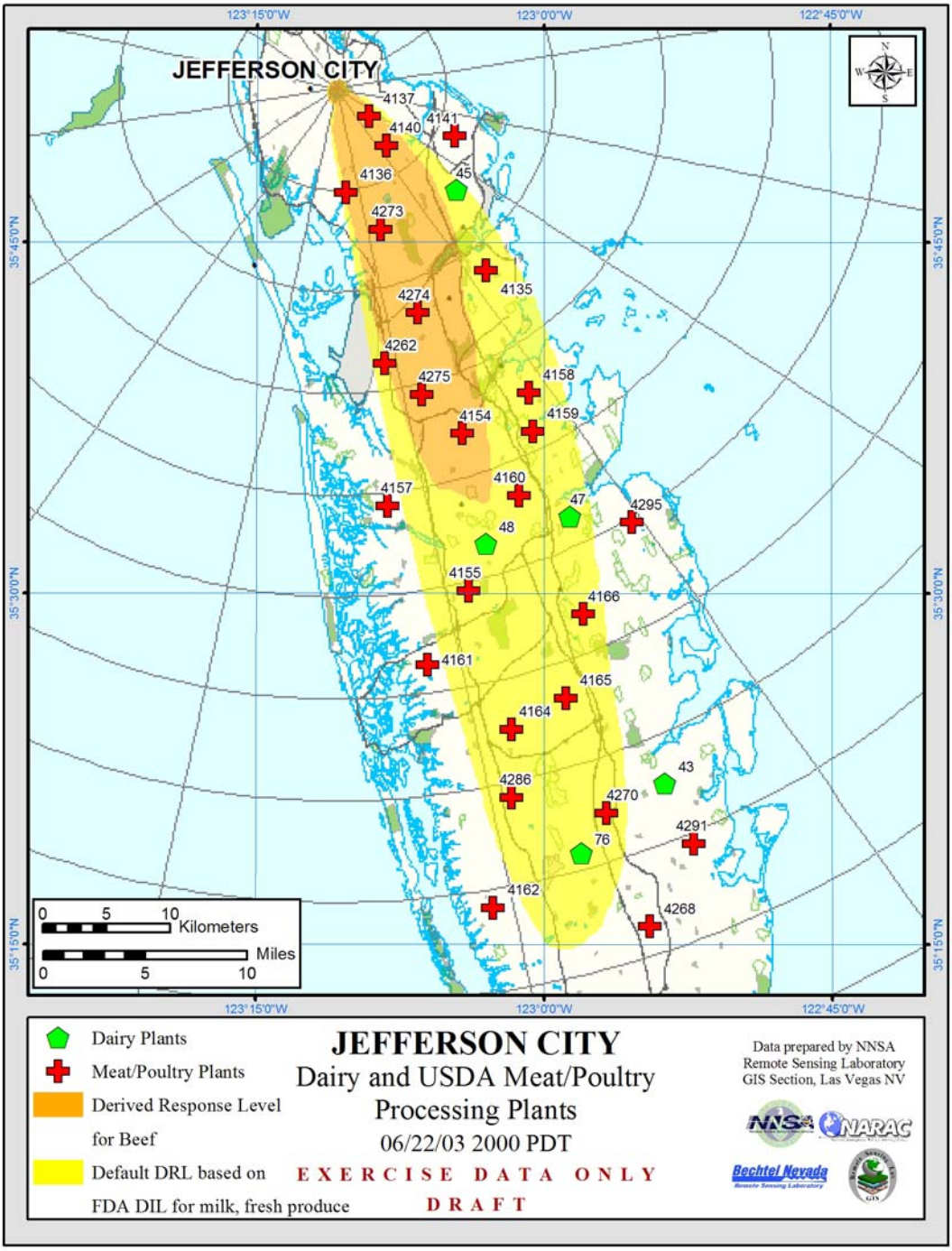


FIGURE C-4. ***MAP OF USDA MEAT/POULTRY PROCESSING PLANTS***

Locations of affected dairy, meat and poultry plants with corresponding derived response level overlay.

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APPENDIX D

AERIAL MEASURING SYSTEM (AMS)

D.1 INTRODUCTION

The AMS is a key element of the NNSA Nevada Site Office (NNSA/NSO) response to a large radiological incident. Large areas can be surveyed quickly to assist the Lead Federal Agency (LFA) and the state(s) in determining the impact of the emergency. The AMS assets, which are operated and maintained by the NNSA/NSO Remote Sensing Laboratory (RSL), are located at Nellis Air Force Base (AFB) in Las Vegas, Nevada, and at Andrews AFB near Washington, D.C.

D.2 ACTIVATION

Before the deployment of the AMS assets, authorization for their release must be approved by DOE Headquarters (DOE/HQ). This authorization is initiated by a request for assistance from the LFA or the state(s) through the Department of Homeland Security (DHS), or from other DOE Emergency Response Groups to the DOE/HQ Emergency Operations Center. Until CM/FRMAC arrives on scene, the Radiological Assistance Program (RAP) Team Leader at the scene will contact and coordinate the AMS flights with the LFA, state(s), and local authorities at the scene.

D.3 CAPABILITIES

AMS-equipped, fixed-wing aircraft are instrument rated, and capable of all-weather operation. Fixed-wing aircraft operate at altitudes as low as 152 meters (500 feet) above ground level and as high as the aircraft's operational ceiling, which is approximately 16,700 meters (35,000 feet) mean sea level. Dependent upon flight conditions, the fixed-wing aircraft's optimum flying time is 5 hours.

Standard instrumentation includes:

- Three sodium iodide detectors (one 2-inch by 4-inch by 16-inch, one 2-inch by 4-inch by 4-inch, and one 1-inch by 1-inch diameter)
- Survey meters for crew dose monitoring and contamination surveys
- Recording equipment
- Radar altitude
- Autonomous Global Positioning System (GPS) position tracking equipment
- Direct readout hardware
- Data analysis equipment

The data are partially analyzed on board and are stored on hard disk for detailed analysis upon landing.

AMS-equipped helicopters operate only under Federal Aviation Administration visual flight rules and will not be deployed during poor weather conditions. Helicopters operate at altitudes as low as 30 meters (100 feet) above ground level, but their actual operational altitudes will be dictated by flight safety concerns. Dependent upon flight conditions, the helicopter's optimum flying time is 2–3 hours. Standard instrumentation includes twelve 2-inch by 4-inch by 16-inch sodium iodide thallium-activated (NaI[*Tl*]) detectors, data formatting and recording equipment, radar altitude and differential GPS position tracking equipment, direct readout hardware, and data analysis equipment. The data are partially analyzed on board and are stored on hard disk for detailed analysis upon landing.

Dependent upon the mission objectives, a precision optical camera, a thermal infrared scanner, and other radiation detectors could also be mounted on the aircraft.

D.4 MISSIONS

An initial AMS flight can be made by one fixed-wing aircraft to rapidly, but coarsely, map the residual fallout pattern and intensity of contaminated debris or material that may have been deposited after passage of the radioactive air mass or cloud. The AMS-equipped aircraft will fly a serpentine pattern (Figure D-1) of flight lines that will encompass a 10-mile radius around the incident site and the entire area suspected of being contaminated. During the flight, cursory radiological data such as peak exposure rates will be sent by radio to the AMS ground control. The initial mapping flight will normally be limited to daylight hours. However, nighttime flights will be considered on a case-by-case basis. Mission deliverables are:

- Color-coded plot map of inferred exposure rate (exposure rate footprint) along serpentine flight path.
- General meteorological conditions.

After the initial broad survey, detailed radiological surveys will be performed to measure and map the extent of the residual fallout deposition, determine the average surface area exposure rate, and identify the specific radionuclides responsible for the contamination and their relative intensities.

Normally, to perform an aerial radiological survey of an area, the AMS-equipped aircraft must fly a series of parallel flight lines at as low an altitude and ground speed as can be safely achieved (Figure D-2).

For the fixed-wing system, the nominal survey altitude is 305 meters (1,000 feet) above ground level with a flight line spacing of 305 meters (1,000 feet) at a ground speed of 72 meters per second (140 knots). For the helicopter system, the nominal survey altitude is 46 meters (150 feet) above ground level with a flight line spacing of 76 meters (250 feet) at a ground speed of 36 meters per second (70 knots). The preferred aerial platform for performing a detailed aerial survey is the helicopter because of its larger-volume NaI[*Tl*] detector array, lower flying altitude, and greater spatial resolution.

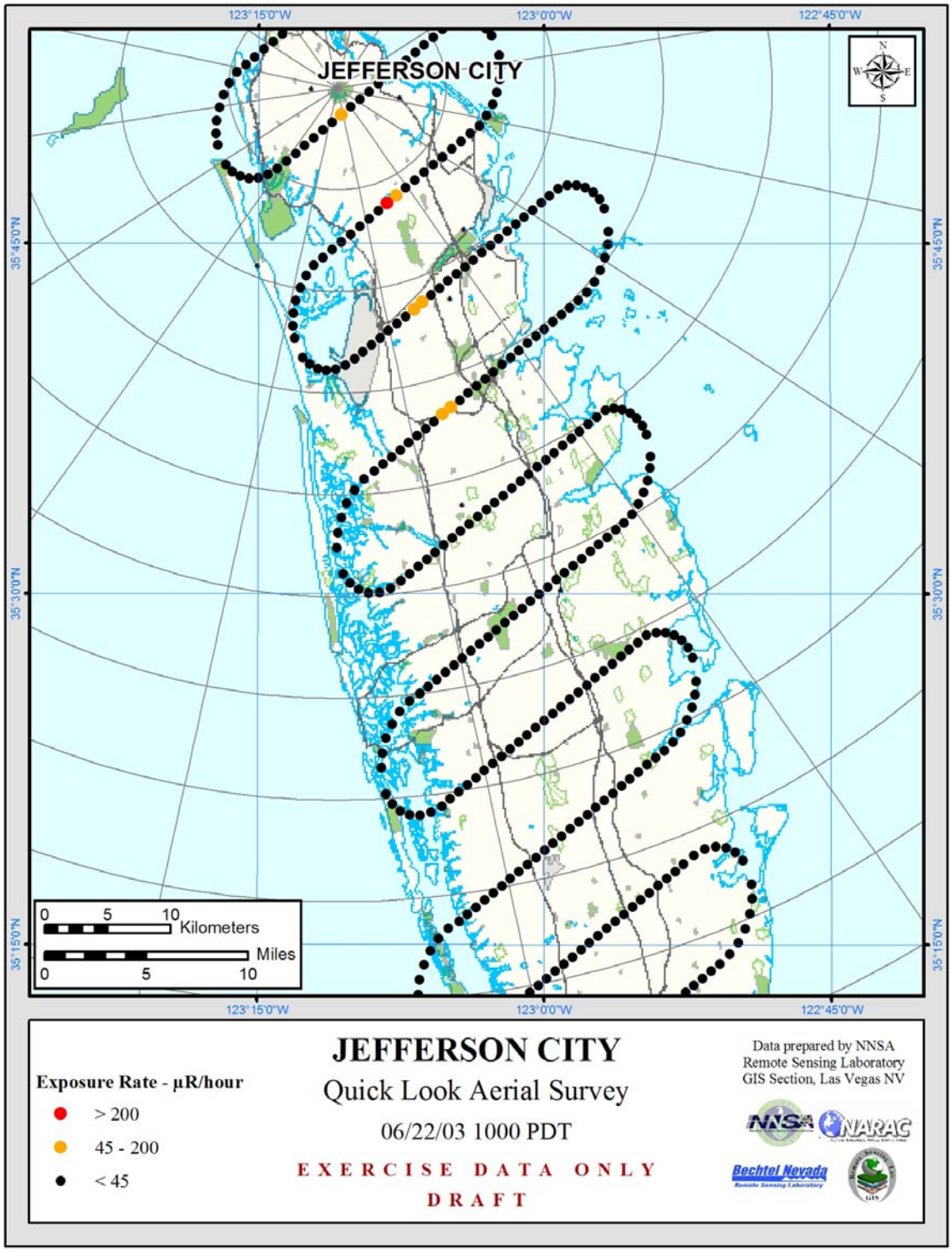

FIGURE D-1. ***SERPENTINE FLIGHT PATTERNS***

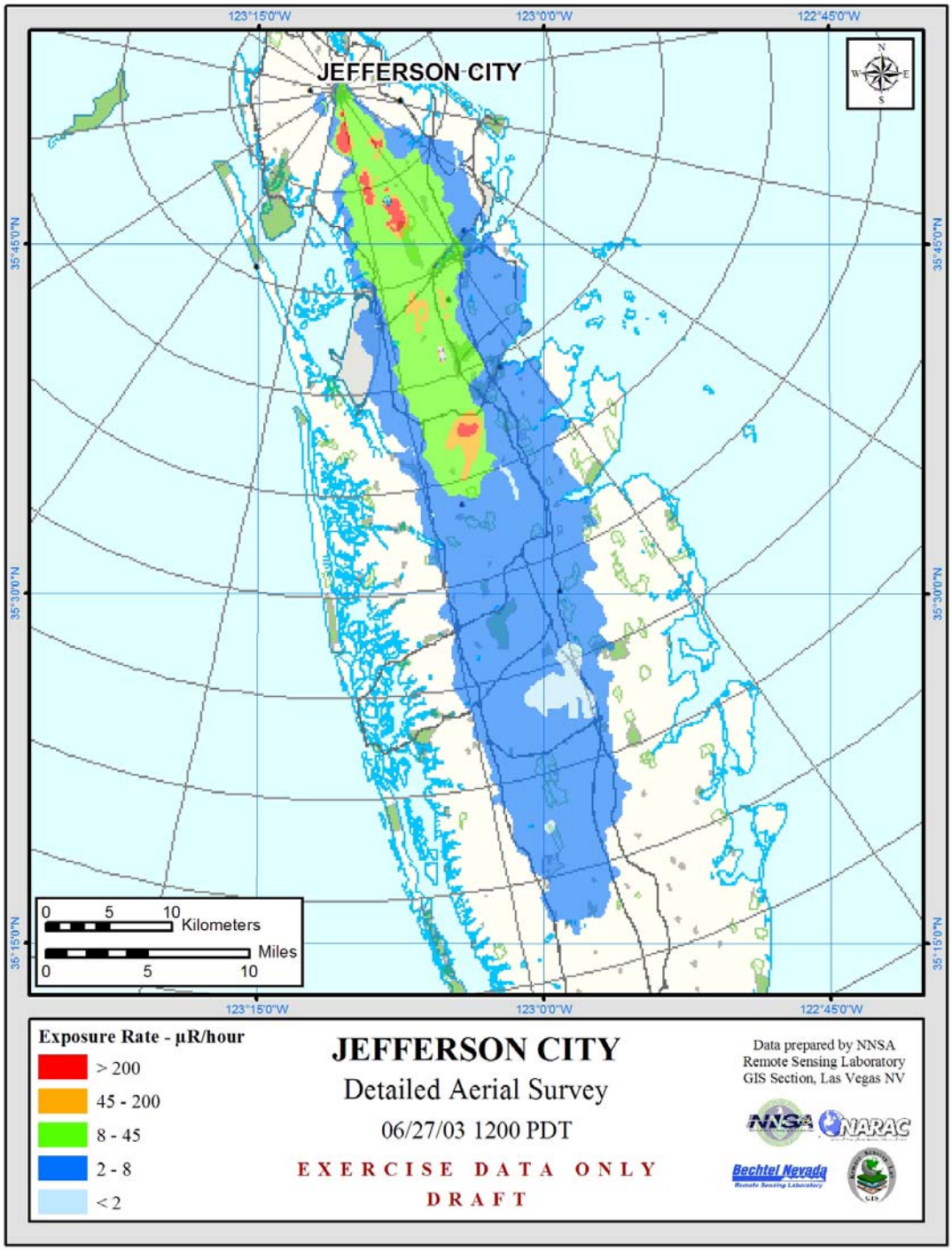

FIGURE D-2. ***HELICOPTER SURVEY***

Flying at an altitude of 46 meters (150 feet) will provide a ground monitoring window (field of view) of approximately 92 meters (300 feet) in width. In this manner, the helicopter can map the ground deposition at a rate of about 10 square kilometers per hour (4 square miles per hour). The radiological survey flights are normally limited to daylight hours. However, nighttime flights will be considered on a case-by-case basis.

After each survey flight, detailed data analysis is performed with the computer analysis equipment on site. The data processing time required to complete each set of flight data is approximately 1-3 hours. Completed survey deliverables are:

- Contour map of inferred exposure rate at one meter above ground level
- Contour map(s) of specific isotope surface area activity
- Identification and magnitude of dominant isotopes (gamma energy spectra)

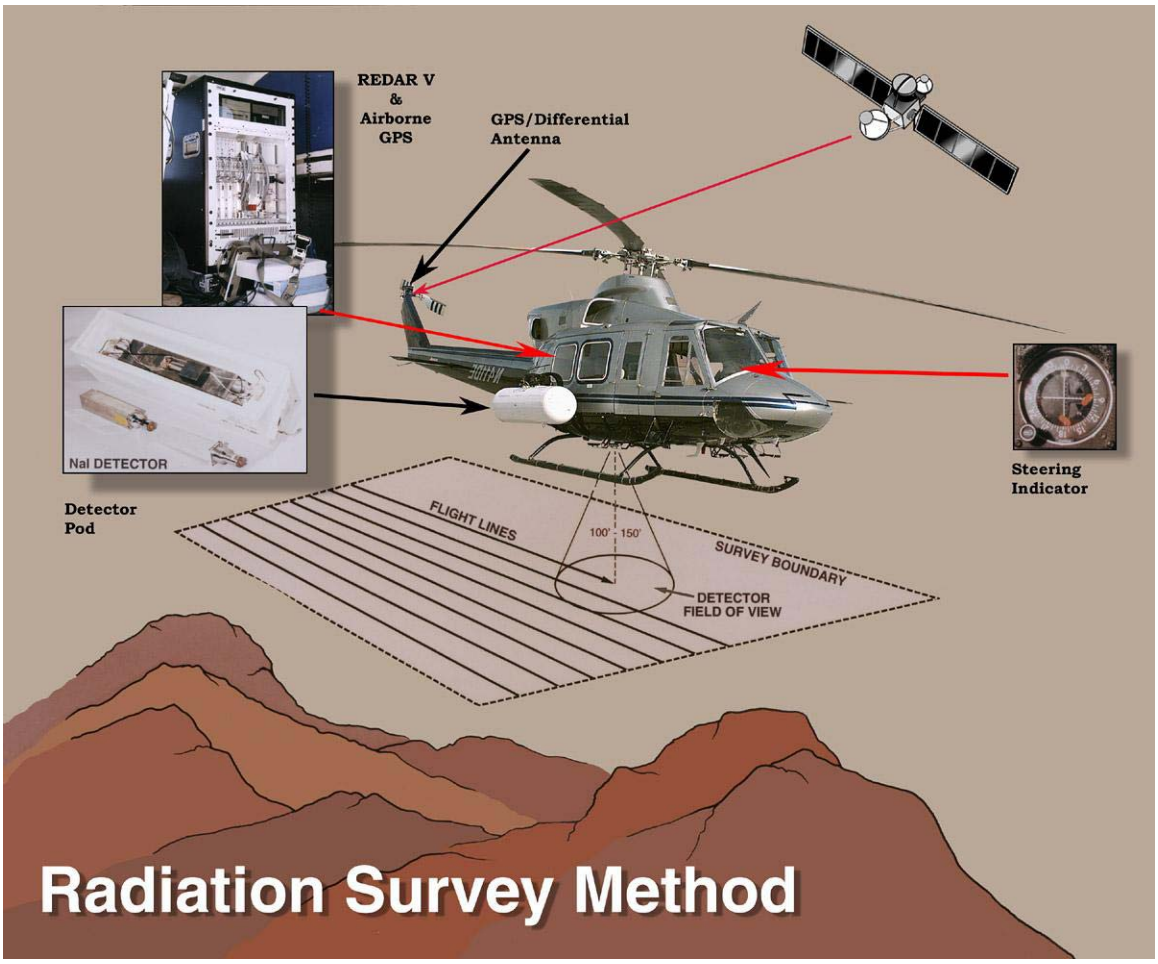

FIGURE D-3. ***TYPICAL AERIAL RADIOLOGICAL SURVEY SETUP***

D.5 AERIAL RADIOLOGICAL SURVEY SENSITIVITIES

The minimum detectable activity limits of the AMS aerial platforms for a typical radiological survey are shown in Table D-1. Sensitivity values are given for typical isotopes in units of microcuries per square meter ($\mu Ci/m^2$), assumed to be surface deposition with no mixture in the soil. The minimum detection level of the inferred man-made exposure rate for both aerial platforms is less that 1 microroentgen per hour above background. Detection sensitivities will vary, depending upon altitudes flown, line spacing, deposition variability, and analysis processing.

Table D-1. AMS Minimum Detectable Activities

Radionuclide	Photopeak Energy (kiloelectron Volts[keV])	Surface Area Deposition[a] ($\mu Ci/m^2$)	
		Fixed-Wing Aircraft[b]	Helicopter[c]
Americium-241 (^{241}Am)	60 keV	430	0.2
Cesium-137 (^{137}Cs)	662 keV	2.0	0.05
Cobalt-60 (^{60}Co)	1,173-1,333 keV	0.3	0.02
Iodine-131 (^{131}I)	365 keV	4.0	0.06

[a] Minimum detectable activity value is the three-sigma value due to the counting statistics in the spectral energy window of the photo peak of interest.

[b] Fixed-wing systems are equipped with one 2-inch by 4-inch by 16-inches NaI(*Tl*) log flown at an altitude of 305 meters (1,000 feet) above ground level, a flight line spacing of 305 meters (1,000 feet), and an average ground speed of 72 meters per second (140 knots). Flying at higher altitudes (e.g., 1,500 feet) will reduce delectability by a factor of 3 or more.

[c] Helicopter systems are equipped with eight to twelve 2-inch by 4-inch by 16-inch NaI(*Tl*) logs flown at an altitude of 46 meters (150 feet) above ground level, a flight line spacing of 76 meters (250 feet), and an average ground speed of 36 meters per second (70 knots). Processing the data using a 9-second averaging routine can enhance the delectability up to a factor of 3. MDA cited are for eight-log detector array.

D.6 RESPONSE TIMES

One fixed-wing aircraft[4] and one helicopter[5] are stationed at both RSL-Nellis in Las Vegas, Nevada, and RSL-Andrews near Washington, D.C. Flight times from both locations for both types of aircraft are shown in Figure D-4 and Figure D-5.

For fixed-wing flight times, the concentric circles depict 480 kilometers (300 miles), representing one hour of aircraft flight time. Refueling stops of a one-hour duration will generally occur at three-hour intervals. Every third circle is color-coded to emphasize the extra time needed for refueling.

For helicopter flight times, the concentric circles show 460 kilometers (290 miles), representing 2.25 hours of flight time. Refueling stops of up to one hour duration will occur at each circle, so the time expended is 3.25 hours for each circle. Maximum daily flight time will not exceed 10 hours for a two-pilot crew. Specific flight routes and times for both types of aircraft will be determined by the pilot-in-command after analysis of weather, aircraft loading, and other pertinent mission information.

[4] Twin-engine fixed-wing aircraft are used by the AMS for initial ground deposition and wind sounding measurements

[5] Twin-engine helicopters are used by the AMS for low-altitude radiation survey detection and monitoring.

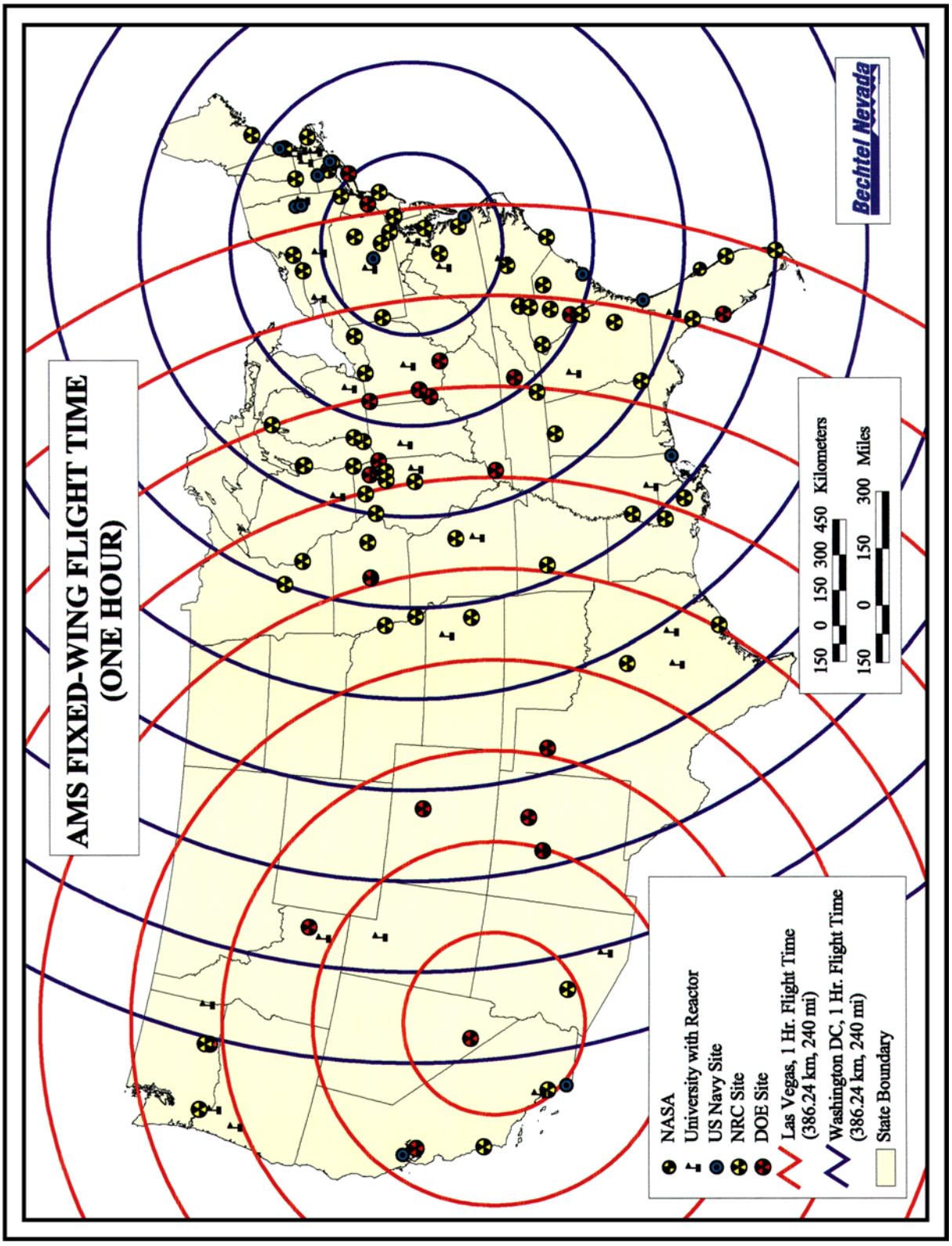

FIGURE D-4. ***RESPONSE FLIGHT TIMES FOR THE FIXED-WING AIRCRAFT STATIONED AT NELLIS AFB AND ANDREWS AFB.***

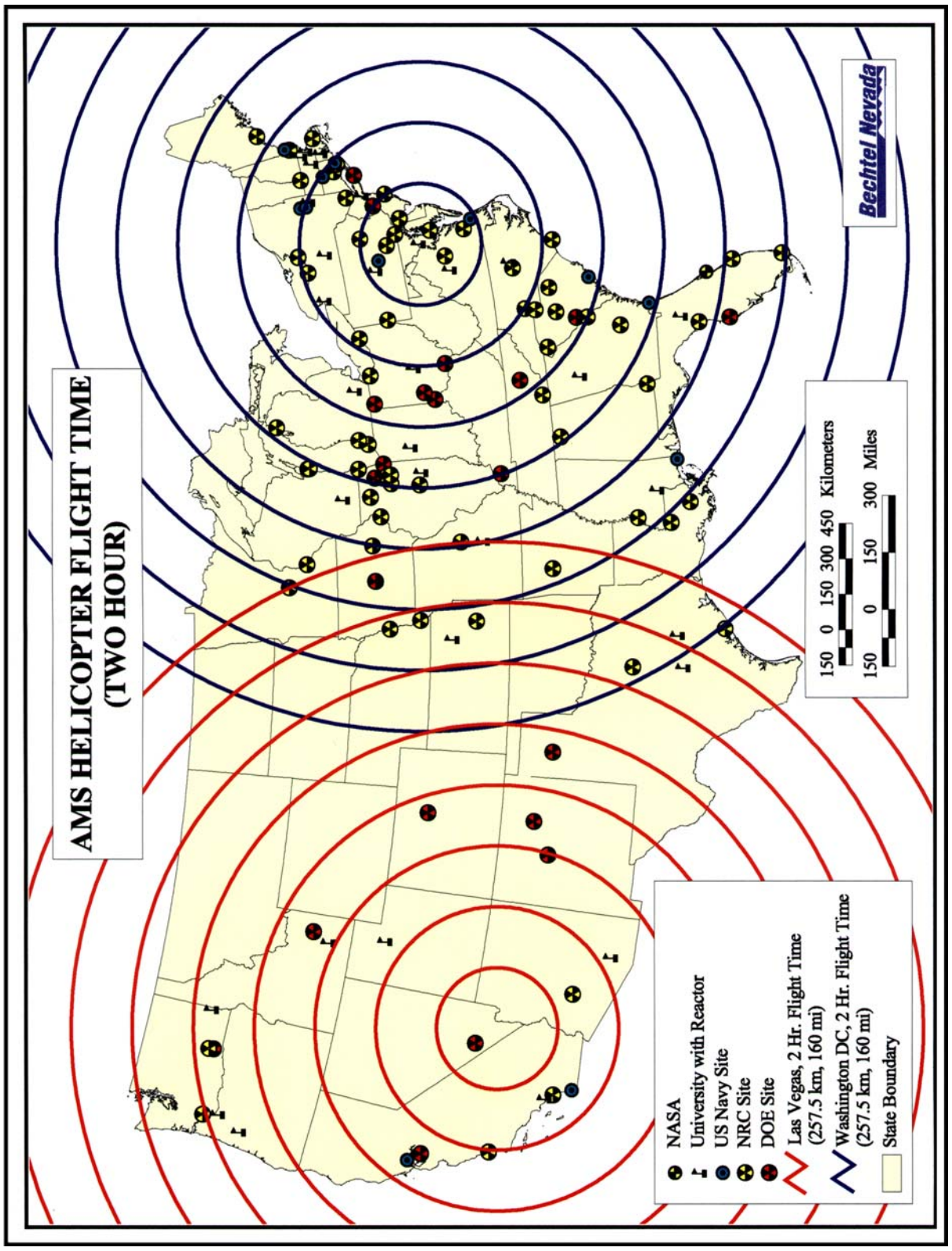

FIGURE D-5. ***RESPONSE FLIGHT TIMES FOR THE HELICOPTERS STATIONED AT NELLIS AFB AND ANDREWS AFB***

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APPENDIX E

ATMOSPHERIC DISPERSION MODELING

E.1 NATIONAL ATMOSPHERIC RELEASE ADVISORY CAPABILITY (NARAC)

The following two standard initial early or emergency phase products are produced by the National Atmospheric Release Advisory Center (NARAC) at Lawrence Livermore National Laboratory (LLNL) for radiological incidents:

1. Four-day Total Effective Dose Equivalent (TEDE) is plotted in roentgen equivalent man (rem). TEDE includes doses from inhalation and cloud shine from cloud passage, four days of ground shine, plus four days of inhalation of resuspended material. Contours are given for the EPA Protective Action Guidelines (PAGs).
2. Total Deposition is plotted in microCuries per square meter. Total deposition is the amount of material deposited on the ground from both wet (precipitation) and dry (gravitational and dispersion) processes.

Standard Intermediate phase products include the following:

1. The first year dose includes the Effective Dose Equivalent (EDE) from one year of ground shine plus the Committed Effective Dose Equivalent (CEDE) from inhalation of one year of resuspended material.
2. Dose from the food ingestion pathways based on FDA Derived Intervention Levels for specific nuclides.
3. Total Deposition.

Each of these products represents effects from the sum of all nuclides released as well as their daughter products. In addition to standard products, organizations can request other products such as air concentration, dose rate, components of the TEDE, or deposition for specific times, nuclides, contour values, or sources.

NARAC mapped products aid in:

1. Assessing the downwind areas receiving doses and surface contamination.
2. Deploying field teams to sample the affected area.
3. Planning for AMS surveys.
4. The development of PARs and protective action decisions.

NARAC products may be requested and received electronically via a client-server application called the NARAC iClient or via the World Wide Web. These tools allow multiple organizations to simultaneously view results. Alternatively products can be e-mailed or faxed to specific users.

NARAC contours are routinely delivered electronically to the FRMAC GIS for inclusion as a layer on large-scale mapped products.

For users with direct electronic connections, initial default NARAC products can be received automatically in 5-10 minutes of the completed request. After initial plots are distributed NARAC meteorologists will modify the source characteristics to match the set of ground and/or aerial survey measurements collected at and distributed from the FRMAC Data Center. It typically takes 30-90 minutes for NARAC to prepare inputs, run models, quality assure calculations, and deliver refined plots based on more detailed information or measurement data. For further information see http://narac.llnl.gov.

NARAC and Sandia National Laboratories' (SNL) High Consequence Assessment and Technology Department have each developed unique and complementary consequence assessment tools that have recently been integrated into a unified tool set.

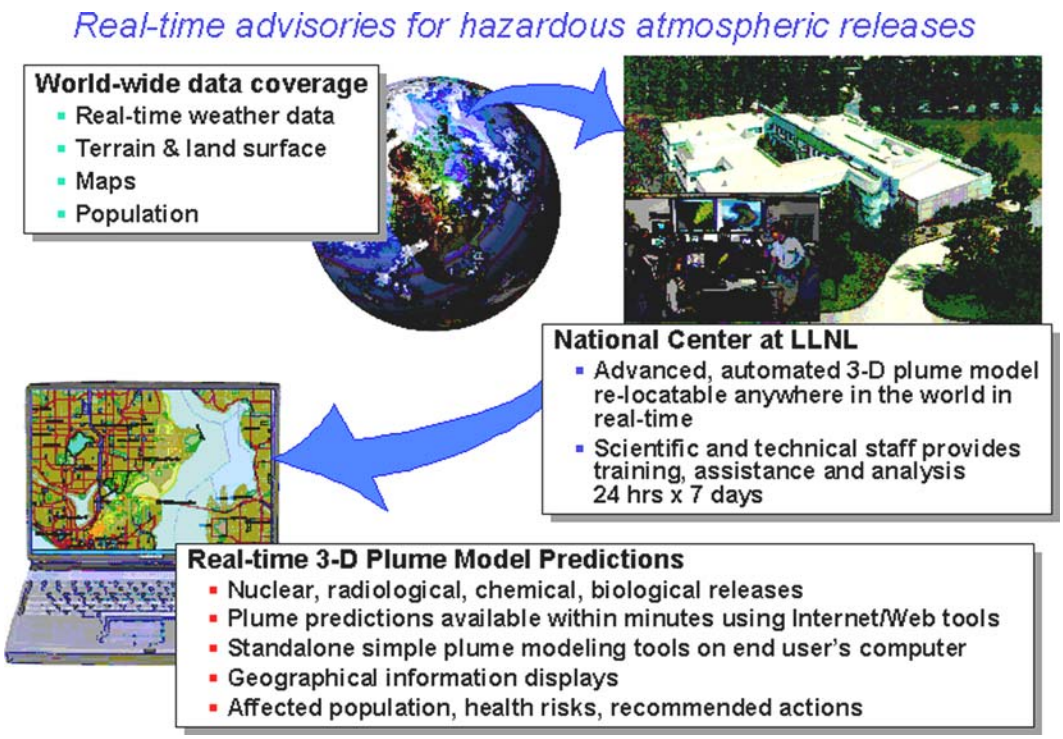

FIGURE E-1. ***NATIONAL ATMOSPHERIC RELEASE ADVISORY CENTER (NARAC) MODELING SERVICES AND TOOLS***

E.2 SANDIA HAZARD ASSESSMENT RESPONSE CAPABILITY (SHARC)

In addition to the radioactive material dispersal capabilities discussed in paragraph 3.6.7, SHARC has the capability of simulating the prompt effects of both conventional and nuclear detonations. Conventional effects simulated include: overpressure versus range, radius of various injuries (e.g., ear drum rupture) on people, and safe distance from the blast. Nuclear effects simulated include: light and heavy damage to various types of structures; deaths, major, and minor injury due

to the prompt radiation, thermal radiation, and overpressure. Human Effects calculations take into account the population distribution among structure types and the protection afforded by the structure.

SHARC also contains a fully integrated GIS viewer and consequence report generator. These capabilities allow SHARC to display contours of dispersed radiation, and other effects, on top of maps that display location features (roads, cities, hospitals, etc.) of interest, and then consequences of the simulation. SHARC is a standalone, self-contained software, capable of simulating a dispersal of radioactive material, producing maps of effect, and generating a report on those effects without the need for support software or a connection to the internet.

SHARC provides a reasonably sophisticated atmospheric dispersion modeling software that can be operated on a laptop computer. It can provide a comprehensive report in less than 30 minutes. The software is intentionally designed to operate as stand-alone software on a laptop or desktop computer while still providing rapid dispersion models that account for atmospheric stability and vertical variability conditions. SHARC's stand-alone capability is comparable to that of LLNL Hotspot software. However, SHARC performs more intricate atmospheric dispersion calculations that can account for the impacts to the plume caused by atmospheric dynamics, as a result the SHARC software takes somewhat longer than Hotspot to produce a report (approximately 15 to 30 minutes). Due to the stand-alone design of SHARC it does not require internet communications to function as is required for some of the more complex features of the LLNL ARAC i/Client software. SHARC is designed to fill the gap between the LLNL Hotspot and ARAC/iClient software by providing more sophistication in the algorithm than Hotspot provides, while still remaining as a stand-alone software capable of running on a laptop or desktop computer. Work is underway to make iClient and SHARC cross-compatible so that one or both software codes can be used depending on the nature of the emergency. SHARC is also integrated with the SNL developed Turbo FRMAC software. The Turbo FRMAC software is designed to assist in the Assessment portion of an event to allow Emergency Planners to make determinations on the radiological deposition and dose to individuals at given locations.

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APPENDIX F

FRMAC SITE SELECTION CONSIDERATIONS

F.1 OVERVIEW

Under most conditions, the Federal Radiological Monitoring and Assessment Center (FRMAC) has the resources to be able to function self sufficiently at the incident site, once given a facility not being used for evacuation purposes, without additional logistical support from the state. The FRMAC's resources help to ensure that operations minimally impact state and local economies without being a burden to them. However, if conditions are extremely severe, either in terms of weather or location (e.g., Point Barrow, Alaska, in January), the CM/FRMAC is not prepared to sustain itself without support from other Federal agencies. The selection of a CM/FRMAC site will include consideration of housing, airport facilities, and vehicle availability. All of these factors may be affected by the magnitude of the emergency, evacuation status, presence of an airborne radioactive plume, and other factors that will only be known at the time of the emergency. In addition, interaction with state and local monitoring activities and the location of emergency operations facilities will be considered. Conditions at the time will dictate CM/FRMAC site selection

F.2 SITE SPECIFICATIONS

Whenever possible, a CM/FRMAC will be located within 16 to 24 kilometers (10 to 15 miles) of the emergency scene to effectively carry out its mission. Because of the expected use of the U.S. Department of Energy's (DOE) Aerial Measuring System assets, the CM/FRMAC location should be convenient to an airport or a helicopter pad to facilitate rapid turnaround. Specific site specifications are situation dependent and will vary in accordance with the level of the response. Following is a description of the site requirements that may *typically* be required for each of the phased response elements. It is important to keep in mind, however, that these requirements are incident dependent.

CMPT

As the CMPT is activated during the crisis phase of an emergency response (i.e., when the potential for a radiological consequence may occur), they only require a modest area in which to meet. An office or a conference room with three or four telephone lines would be adequate. The CMPT is an asset to the state and local emergency planners, so a location conducive to meeting with these managers would be ideal.

CMRT I and CMRT II

Should the radiological incident escalate to a level requiring a CMRT I deployment, state officials may need to begin preparations to seek additional space to accommodate the arrival of a CMRT I

team of 16 personnel. Upon arrival, the CMRT I team will work with state and local emergency responders to identify the status and magnitude of the incident. This initial meeting will provide a basis to establish the arrival of the CMRT II augmentation team.

To facilitate the movement of the response from the initial small CMPT to the larger CMRT II, state planners can identify a number of sites in the pre-planning process. This effort will allow more valuable time to be used to address other important issues such as logistical needs and requirements when meeting with Federal counterparts since several potential locations will already have been identified.

FRMAC

If the CMRT II response is expected to evolve into a large-scale deployment (a FRMAC) an indoor workspace of 929 to 1,858 square meters (10,000 to 20,000 square feet) is required. Space must be available for administrative functions and for specialized equipment, such as a Geographic Information System, communications, photography, and still video. A large, fenced, staging area is needed for shipping and storage of supplies, large trucks and analysis vans, and the setup of outdoor communications equipment. Adequate electrical service must be available. However, DOE has the capability of providing sufficient electrical service, if required.

The availability and suitability of the following facilities and resources will be considered in the selection of a FRMAC site:

1. Site access—airport and/or major highways to accommodate large trucks and vans
2. Communications—clear of interference, appropriate terrain for a satellite antenna, telephone trunk lines
3. Housing—hotels or military quarters
4. Vehicle rental, including several types of large trucks and vans
5. Medical facilities—hospital or dispensary
6. Food services—round-the-clock catered service
7. Materials and services—office supplies, minor repairs, and security.

F.3 SITE SELECTION

A final FRMAC operating site will not be selected until an incident occurs. This is due to the fact that the CM/FRMAC may be responding in the aftermath of an earthquake, hurricane, flood or possible terrorist activity. A significant radiation release may preclude access to preselected CM/FRMAC sites due to possible contamination. Therefore, any preselection of CM/FRMAC sites is limited to simply identifying one or two potential locations for each major, fixed nuclear facility. The DOE Regional Coordinating Offices should be informed of the identity and location of these potential CM/FRMAC sites.

Members of the CMRT I, in consultation with the Lead Federal Agency, state(s), and local authorities, will make the final selection of a FRMAC site based on the current emergency conditions. Potential CM/FRMAC locations include armories, schools, hotels, and hangars (Figure F-1).

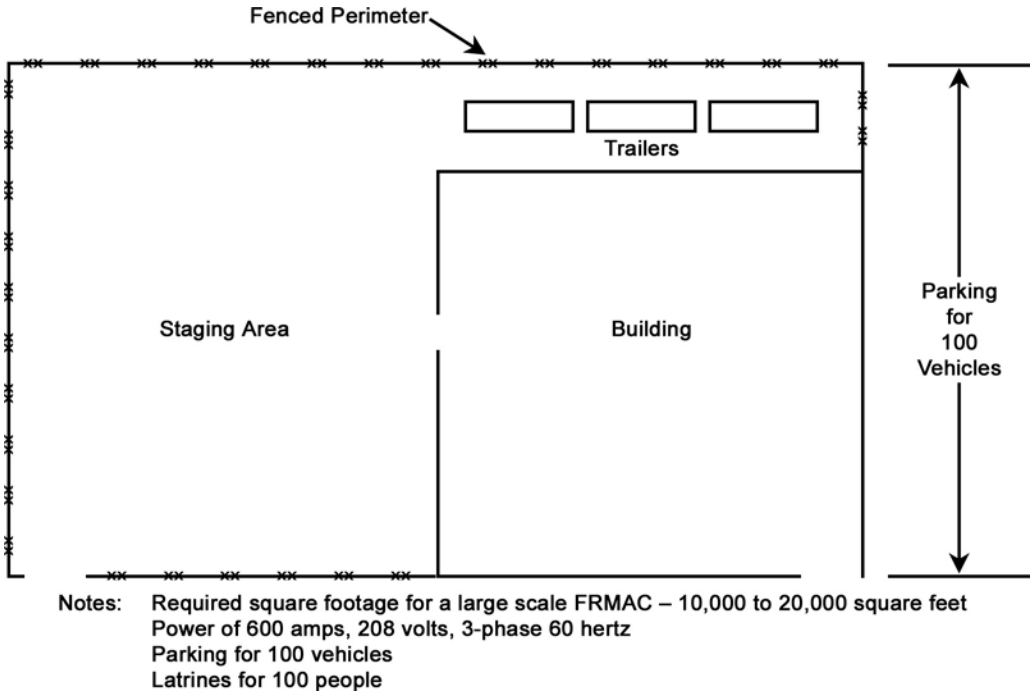

FIGURE F-1. ***EXAMPLE OF A POTENTIAL CM/FRMAC SITE***

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APPENDIX G

STATE ASSISTANCE AND LOGISTICAL REQUIREMENTS

G.1 STATE PERSONNEL

The most important contribution that state officials can bring to a CM/FRMAC response are its people and their local knowledge. Trained state and local personnel are an essential resource in ensuring the CM/FRMAC priorities for monitoring and assessing the radiological hazard are established in accordance to *state requirements and needs*.

State officials working within the CM/FRMAC act as the primary point of contact between the Governor or other high-ranking state officials. State and Federal health physicists will work together to determine the extent and level of contamination in terms of radiation dosage to the population and the environment.

State personnel should plan on participating in shifts and supporting a CM/FRMAC 24-hours per day, 7 days a week until the initial phase is over and the environment has been characterized. The number of state and/or local personnel required to support a CM/FRMAC is a function of what the state can adequately afford. Optimally, a minimum of *7 state or local personnel* would be required. They would include during the day shift the senior state official working with the FRMAC Director, a monitoring liaison, radiation assessment liaison, and a field team coordinator. The evening shift would optimally require a senior state official, a monitoring liaison manager and a radiation assessment liaison. State functional participation within the CM/FRMAC would also benefit greatly by having personnel involved in Health and Safety as well as other critical positions within the CM/FRMAC, including administrative support.

In addition, and if available, CM/FRMAC could utilize as many state radiological field monitoring teams as possible. These key state monitors would team with Federal, National Laboratory, and contractor monitors to provide environmental monitoring and sampling throughout the region. Their knowledge and experience in the area would be invaluable to the overall credibility of the environmental data and radiation analysis performed at the CM/FRMAC.

G.2 LAW ENFORCEMENT

In addition to the personnel requested above, another asset state and local officials can provide is security. The CM/FRMAC will require a security perimeter that must be maintained by law enforcement with the jurisdiction to control crowds and traffic at various locations. CM/FRMAC will require 24-hour law enforcement services to the extent that state and local agencies can provide.

In the event that local law enforcement cannot be obtained and controlled by state resources, it may be necessary to employ Federal security, including the use of military personnel, federal agents, or

off-duty local law enforcement. State planners can assist by coordinating in advance with local law enforcement agencies for this purpose.

G.3 LOGISTICS

With a large number (in excess of 250) of state, specialized Federal, contractor, and National Laboratory personnel working in the FRMAC 24 hours per day, it will be necessary to accommodate the staff with transportation, food, and lodging. State officials can greatly assist Federal planners in this area.

State officials can greatly assist in meeting the demand for transportation. These needs can be met using school buses, rental cars, or other forms of mass transportation. School buses can be of great benefit during shift changes since it is likely schools will not be in session while the incident is on-going. State officials may also be able to obtain a number of trucks, vans, and sedans from their available state inventory to assist in transporting CM/FRMAC participants and equipment. If possible, and if liability issues can be resolved, it would be of great benefit to allow CM/FRMAC staff to use state vehicles if rental vehicles are unavailable.

Field monitoring and sampling teams comprised of both state and Federal teams will be among the highest priorities for trucks and vehicles. Vans and trucks will be required for a variety of sampling and data collection.

Hotel rooms will also be at a premium since non-critical members of the media and others may seize a large number of limited hotel rooms in an area. Securing essential facilities for critical support staff is a highly recommended action.

Some state planners have suggested that agreements be set in place between car rental companies and hotels. These agreements may help to ensure the availability of rental cars and hotel rooms when they are in short supply.

G.4 MATERIAL ASSETS

Aircraft Support

The deployment of multiple large cargo aircraft to the affected region will require state officials to assist in the identification of one or more nearby airports. It can be expected that the Federal government would deploy a number of military aircraft. These large aircraft require a minimum runway length of 3,000 feet and can weigh as much as 770,000 pounds. Personnel and equipment would be required to assist with unloading the aircraft. A 10,000 pound forklift with 36-inch tines is required to off-load and move the pallets. Once unloaded the equipment would be moved to the facility designated for the CM/FRMAC or, if a facility has not yet been identified, to a holding area.

In addition, fixed-wing aircraft and helicopters will be brought in to support the on-going mission of the CM/FRMAC. It is necessary to ensure that the proper type and amount of fuel is available to support all aircraft. This would include general aviation fuel as well as jet fuel.

In addition, state personnel could also assist in collecting and transporting data taken from the aerial radiological surveys to decision makers.

Aircraft	*C-130*	*C-141B*	*C-5*	*C-17*	*KC-135*	*KC-10*
Manufacturer	Lockheed	Lockheed	Lockheed	McDonnell-Douglas	Boeing	McDonnell-Douglas
Popular Name	Hercules	Starlifter	Galaxy	Globemaster	Strato-Tanker	Extender
Basic Weight	80,000lbs	150,000lbs	374,000lbs	276,000lbs	123,000lbs	252,000lbs
Max Weight	155,000lbs	323,000lbs	769,000lbs	580,000lbs	323,000lbs	590,000lbs
Max Fuel	62,000lbs	153,000lbs	332,000lbs	184,000lbs	203,000lbs	355,000lbs
No. of Pallets	6	13	36	18	6	22
Min Runway Length	3,000′	6,000′	6,000′	3,000′	7,000′	7,000′
Min Runway Width	80′	98′	148′	90′	148′	148′
Min Taxiway Width	30′	50′	75′	50′	75′	75′

CHART G-1. MILITARY AIRCRAFT REQUIREMENTS BY TYPE

Laboratory and Medical Supplies

Local laboratories, either nearby or at the scene, can provide environmental radiation contamination results to state and Federal decision-making officials quickly; however, CM/FRMAC will also need access to local suppliers of liquid nitrogen, distilled water, and other laboratory-related supplies.

CM/FRMAC deploys with licensed physicians who specialize in radiological contamination and medical supplies. In the case of deployment to a remote location where nearby medical facilities are unavailable, CM/FRMAC may also deploy with paramedics.

A very large volume of environmental field samples will be collected for analysis. While a very small sampling of data can and will be processed in the field for quick results, the vast majority of the samples will be analyzed at designated certified laboratories throughout the country. The state can help by pre-planning and working with overnight delivery services to ensure that the flow of data is not interrupted and given the highest priority.

Other Assets

Other useful information that state and local officials can provide to the CM/FRMAC includes GIS data from local utilities as to the location of utility poles (telephone and power), man-hole covers for sewers, other access areas, and known global positioning satellite (GPS) location points throughout

the region. In addition, latitude and longitude reference points, using GPS systems, will identify all field data collected.

Portal monitors will also be of great value in a large, potentially contaminated region. In the case of a large incident, it is expected that a large volume of people would request to be examined. The use of portal monitors is more efficient for scanning a large number of people for radiation contamination than handheld instruments.

The CM/FRMAC will also bring a large amount of environmental radiation detection to the scene. State and local field monitoring teams may need to verify proper operation of their equipment and instruments to FRMAC standards. State and local equipment would then be added to the overall inventory of equipment available for use by field monitoring teams.

APPENDIX H

FRMAC ADVANCE PARTY ISSUES

H.1 INTRODUCTION

The Federal Radiological Monitoring and Assessment Center (FRMAC) conducts an Advance Party Meeting at the emergency site as part of the initial response. The primary purpose of the U.S. Department of Energy's (DOE) phased response is to provide initial technical capability and to prepare for the arrival of additional CM/FRMAC resources in order to ensure an effective and timely CM/FRMAC operation in support of the Lead Federal Agency (LFA) and the state(s).

This Appendix describes CM/FRMAC Advance Party issues and includes an example of an Advance Party Meeting Checklist (Figure H-1), a sample FRMAC Monitoring and Sampling Plan (Figure H-2), and a Monitoring and Sampling Implementation Plan (Figure H-3). The issues discussed herein should be used as a guide for planning purposes. Actual FRMAC Advance Party actions and meeting agendas may be modified to meet the emergency conditions.

H.2 HOME TEAM SUPPORT

Home Team support is provided to the CMRT I and to the follow-on consequence management teams by teams located at DOE's Remote Sensing Laboratory (RSL) in Las Vegas, Nevada, and at the national laboratories. From their various locations, the teams can:

- Provide ACRID or NARAC effects models to the field teams as soon as the field teams arrive on-scene allowing for a very early initial assessment of the situation.
- Run Turbo FRMAC calculations and provide results to the field Assessment Scientists early in the event.
- Provide early map and GIS location information to the field teams.
- Perform effects and prediction models run in parallel with the fielded team to:
  - Confirm field team results.
  - Evaluate additional scenarios in support of field team efforts.
- Provide weather data related to the event site in the event that web access is not available or if better information is available.
- Home Team Assessment Scientists can perform the more complex/involved assessment calculations supporting the field Assessment Scientists and provide technical information to aid in out-of-the-ordinary assessment requests.

H.3 PRIOR TO DEPARTURE FOR THE INCIDENT SITE

The Nuclear National Security Administration Nevada Site Office (NNSA/NSO) will:

- Identify the Department of Energy Senior Energy Official (SEO) who will meet the CMRT I.
  - If not upon arrival at the airport, when and where?
- Identify the LFA official who will meet the initial CMRT I.
  - If not upon arrival at the airport, when and where?
- Notify the LFA, state, local, and/or facility representatives of the tentative arrival schedule of the CMRT I and establish a tentative date, time, and location for the Advance Party Meeting.
- Electronically transmit to the LFA, state, local, and/or facility representatives the Advance Party Meeting Agenda.
- Obtain the National Atmospheric Release Advisory Capability (NARAC) plot.

H.4 UPON ARRIVAL ON–SCENE

The CMRT I will:

- Notify NNSA/NSO, DOE Headquarters (DOE/HQ), LFA, and state(s) of arrival and obtain updates.
- Obtain specifics from the Home Teams for the Advance Party Meeting.
- Meet with the on-scene SEO, Radiological Assistance Program (RAP) Team Leader, and Aerial Measuring System (AMS) Team Leader.
  - Identify status, activities, and problem areas.
  - Are DOE/HQ and NNSA/NSO being kept up-to-date?
  - What DOE/other federal assets have been activated, are en route, or are on-site?
  - Suggestions for locating the FRMAC.
- Obtain updated Sandia Consequence Report or NARAC Plot.
- Meet with the LFA official to identify status, activities, and problem areas.

H.5 ADVANCE PARTY MEETING PRODUCTS

The initial FRMAC Monitoring and Sampling Plan will reflect LFA and state requirements and may include the following general priorities:

PRIORITIES FOR INITIAL FRMAC MONITORING AND SAMPLING PLAN

- Identify state/local requirements.
- Identify LFA requirements.
- If release is ongoing or projected, determine the presence of radioiodines
- Monitor close to evacuated areas where people are located.
- Identify areas that have not been evacuated, but where early health effects are possible (100 rem in four days; i.e., 1 rem per hour).
- Identify areas that have not been evacuated, but where the federal protective action guide (PAG) for evacuation may be exceeded (greater than 1 rem in four days; i.e., without knowing isotopic ratios, 10 mrem per hour).
- After deposition, determine isotopic ratios.
- Provide a measure of the validity for the dispersion models in use.
- Establish air sampling stations to measure resuspension and future plume releases.
- Monitor institutions, facilities, and/or residences located in the evacuated areas which were not evacuated or where people must reenter.
- Identify hot spots.
- Characterize the off-site area.

Federal Radiological Monitoring and Assessment Center
(FRMAC)
Advance Party Meeting Checklist

I. *List Key Officials, EOC(s) and Liaison(s) Information*

Positions	Name	Location of Operation/ Phone Number#
Key Officials: ***Identify Lead Federal Agency (LFA), state, tribal, county, and local response leaders, and introduce FRMAC leaders. Enter all available contact information.***		
Principal Federal Official		
FRERP Lead Federal Official		
Lead State Official		
Lead Local Official		
Advisory Team		
State Logistics Support		
FRMAC Director		
FRMAC Operations Mgr.		
FRMAC Monitoring Mgr.		
FRMAC Assessment Mgr.		
FRMAC Health & Safety Mgr.		
FRMAC Support Mgr.		
EPA Sr. Official		
Other Federal Agencies Involved in Response: ***Identify and provide contact information for other Federal agencies involved in the response.***		
HSS		

FIGURE H-1. ***ADVANCE PARTY MEETING CHECKLIST***

FEMA		
NRC		
USDA		
EPA Regional		

Operational EOCs: ***List the status of and contact information for activated Emergency Operations Centers (state, local government).***

EOC	Contact Name	Location of Operation/ Phone Number#

Liaison(s): ***Identify state and local contacts available to assist FRMAC with support and information for logistics functions (locating facilities for FRMAC, operations center, air cargo delivery, field staging areas, Aerial Measuring System [AMS] landing sites, fuel availability, radio frequencies, etc.).***

Organization	Contact Name	Location of Operation/ Phone Number#

FIGURE H-1. ***ADVANCE PARTY MEETING CHECKLIST (continued)***

II. ***Present the Advance Party Briefing: FRMAC Director.***

III. ***Identify the Group Leads for Technical/Operational Meetings.***

Monitoring and Sampling:	
Assessment:	
Health and Safety:	
Laboratory Analysis:	
Support:	
Restoration:	
(Other):	

IV. ***Status/Description of Incident (On-Site and Off-Site)***

Has a release occurred? *Identify if a release has occurred by marking "Yes" or "No". If more than one release has occurred, so indicate on the line below.*	Yes	No
If so, has it terminated? *If a release has occurred, identify if it has terminated by marking "Yes" or "No" Add any additional information in space below.*	Yes	No
What is the source term (measurements, isotopic identification, predictive models, etc.)? *Identify the estimated source term(s), dominant isotopes, and meteorological conditions present during the release. If any actions have been taken to stop and/or mitigate the release(s), state them here*		

FIGURE H-1. ***ADVANCE PARTY MEETING CHECKLIST (continued)***

What computer models have been run? *State whether any atmospheric prediction plots or other computer models have been made*
Where are the resulting data products? *If plots have been made, state where, or how, may they be obtained.*

Has any data been collected or samples taken? *Indicate if any off-site monitoring/sampling results are available by marking "Yes" or "No." If "Yes", please complete the following.*	Yes No

How does FRMAC obtain this data? *Describe how FRMAC can obtain the data from the above, if applicable.*
Who makes the Protective Action decisions? *(State who has the responsibility for initiating/amending public protective actions (i.e., state, tribal, county, local authorities).*
What is the status of Protective Actions taken for public protection? *(Provide brief summary of actions taken in the space below. Continue on separate page, if necessary).*

FIGURE H-1. ***ADVANCE PARTY MEETING CHECKLIST (continued)***

V. ***List of Concerns and Priorities.***

List operational problems, greatest needs/resource shortfalls. Prioritization will be done at Advance Party Meeting.		
Agency	**Concern**	**Priority** *(Leave blank. Complete at Advance Party Meeting.)*
State		
Local		
Other Federal Agency		
Nuclear Facility		

FRMAC Director _____

LFA Representative _____

State Representative _____

Local Representative _____

FIGURE H-1. ***ADVANCE PARTY MEETING CHECKLIST (concluded)***

Monitoring and Sampling Plan

Weapons Dispersal Accident

(Example from Dingo Dawn Exercise)

1. Assess the footprint to determine the area of radiological concern where EPA Protective Action Guidelines (PAGs) are exceeded. Measured activity levels of Am-241 will be used to assess the doses to the population.
   a) Field teams will collect one hour high-volume air samples in order to determine resuspension factors over the long term. Resources will be concentrated on populated areas near the boundaries where PAGs could be exceeded (isopleth line). Accurate measurements of the resuspension factor will provide much better estimates of doses to the population over the long term (1 year or more). High-volume air sampling systems will be set up at a sampling rate of 10-40 cubic liters per minute (depending upon dust loading).
   b) Based upon the calculated doses and anticipated time inside the contaminated area, it is not anticipated that face/breathing protection will be necessary of emergency worker activities. However, face/breathing protection is suggested for any extended remediation activities within highly contaminated areas.
   c) Field teams will take ground deposition measurements using Violinist III systems and High Purity Germanium *in situ* spectrometers sensitive to plutonium and americium contamination. Field monitoring measurements of approximately 15 minute (900 seconds) duration are required in order to reach a Minimal Detectable Activity (MDA)s below 100 nCi/m^2 (Violinist III) and 30 nCi/ m^2 (HPGe *in situ* system). Resources will be prioritized to provide ground-truth measurements for the aerial data, and to provide improved deposition data near the boundaries where the EPA PAGs may be exceeded. The *in situ* measurements will also be used to verify the assumed mix of the dispersed isotopes.
   d) Field soil sampling measurements will be taken in the affected area in order to verify the deposition levels measured with the aerial and field monitoring equipment. Soil samples of 100 cm^2 will be collected in accordance with the FRMAC Monitoring and Sampling manual.
   e) Rotary wing aerial measurement equipment will conduct aerial survey operations over the affected area to determine activity levels. Mission parameters will be 150 foot altitude above ground level (AGL) and a 250-foot line spacing at a speed of 70 knots. One helicopter and the associated aviation and technical personnel can be deployed to the incident site and can cover an area of approximately 20 square miles per day.

      Initial surveying of the affected area will give a Minimum Detectable Activity (MDA) of approximately 100 nCi/m^2 which is sufficient for delineation of the area affected by the EPA PAGs.

FIGURE H-2. ***EXAMPLE OF A FRMAC MONITORING AND SAMPLING PLAN***

2. Special request locations (i.e.; hospitals, nursing homes, Indian reservations, etc.) will be surveyed and characterized as needed. Violinist III, alpha probes, *in situ*, and air sampling will be used as appropriate to characterize these locations.
   a) North Kitsap High School surveyed for contamination to allow potential use as a receiving center for evacuated personnel.
   b) Survey the Navy Hospital and Harrison Hospital in Bremerton and Harbor View Hospital in Seattle and as necessary potentially contaminated personnel.
3. Identify location of, and characterize access control points. Based upon plume modeling and initial radiation monitoring data, the location of access control points will be determined. Radiation Control Technicians and Health Physicists will provide survey support at the control points. The intended location of the control points will be surveyed with alpha survey instrumentation (Nuclear Research Corporation Health Physics kits) to a level of 20 dpm/100 cm^2 (DOE release level).

MONITORING & SAMPLING MANAGER:_____

LOCAL CONCURRENCE: _____

STATE CONCURRENCE:_____

TRIBAL CONCURRENCE: _____

LFA CONCURRENCE: _____

FRMAC DIRECTOR: _____

SEO CONCURRENCE:_____

FIGURE H-2. ***EXAMPLE OF A FRMAC MONITORING AND SMPLING PLAN (continued)***

Monitoring and Sampling Implementation Plan

Weapons Dispersal Accident

(Example from Dingo Dawn Exercise)

Day 2 of Event

1. Assess the footprint to determine the area of radiological concern where EPA Protective Action Guidelines (PAGs) are exceeded. Measured activity levels of Am-241 will be used to assess the doses to the population.
   a) Two teams will be assigned to transverse the plume to verify the ground deposition identified by the ARAC/SNL plots. One team will start at the Bangor Subase boundary and the other will start in the area of the Port Madison Indian Reservation. These teams will take alpha probe measurements and 15-minute (900 second) Violinist III ground deposition measurements, which will provide a Minimal Detectable Activity (MDA) below 100 nCi/m^2.
   b) A third team will start in the area of Poulsbo and will also take alpha probe measurements and 15-minute (900 second) Violinist III ground deposition measurements, which will provide MDAs below 100 nCi/m^2. This team will be equipped with a High Purity Germanium *in situ* spectrometer, which will provide MDAs below 30 nCi/m^2 for 15-minute (900 second) measurements. One *in situ* measurement will be taken at approximately Sherman Hill Road and Viking Way NW if alpha probe measurements are above 300 dpm. The *in situ* measurement will be used to verify the assumed mix of the dispersed isotopes. In the area of Viking Way NW and Liberty Road, this team will establish an air sampling station and collect a one hour high-volume air sample (sampling rate of approx. 30 cubic liters per minute), complete ground surveys using an alpha probe and Violinist III, collect another *in situ* measurement, and collect a soil sample. This information will be used to determine resuspension factors.
   c) Based upon the calculated doses and anticipated time inside the contaminated area, it is not anticipated that face/breathing protection will be necessary for emergency worker activities. However, face/breathing protection is suggested for any extended remediation activities within highly contaminated areas.
   d) Rotary wing aerial measurement equipment will be deployed and conduct aerial survey operations over the affected area to determine activity levels starting at daylight.

FIGURE H-3. ***EXAMPLE OF A FRMAC MONITORING AND SAMPLING IMPLEMENTATION PLAN***

Helo Survey	**DAY 2 AM**	**Flight #1**
Goal:	First flight will under-sample the area, but should provide a good definition of deposition extent.	
Reasoning:	Based on width of ACRID Set 3 prediction, use 9-mile long lines => 10 minutes per line 2 ½ hour flight time => 30 lines Want to cover approximately 20 miles from GZ Use 5,000-foot line spacing	
Flight parameters:	150 foot AGL 5,000-foot line spacing Flight lines oriented North-South Start at water's edge west of GZ Lines are centered N-S on GZ Stop when no land is under flight lines	

Helo Survey	**DAY 2 Noon**	**Flight #2**
Goal:	Begin detailed mapping of deposition	
Flight Parameters:	150 foot AGL 250-foot line spacing Flight lines oriented North-South Start about 4 lines (1000 feet) west of GZ Lines are centered N-S on GZ Length of lines: 6 miles Total number of lines flown => 20 lines (about 1 mile along deposition)	

Helo Survey	**DAY 2 PM**	**Flight #3**
Goal:	Continue detailed mapping of deposition	
Flight Parameters:	Same as Flight #2, except that the length of lines will be determined from data analyzed from Flight #1	

FIGURE H-3. ***EXAMPLE OF A FRMAC MONITORING AND SAMPLING IMPLEMENTATION PLAN (continued)***

e) Special request locations (i.e.; hospitals, nursing homes, Indian reservations, etc.) will be surveyed and characterized as needed. Violinist III, *in situ*, and air sampling will be used as appropriate to characterize these locations.

f) A forth team will survey North Kitsap High School for contamination to allow potential use as a receiving center for evacuated personnel. Violinist III and alpha probe measurements will be taken and a one hour high volume air sample collected.

g) A fifth team will deploy to the Harbor View Hospital, Harrison Memorial Hospital, and Navy Hospitals in Bremerton and survey the facility and personnel, as necessary, for contamination. ADM 300 alpha probes will be used for personnel contamination surveys and appropriate Violinist III and alpha probe measurements taken to determine potential contamination levels of these facilities and associated parking areas and driveways.

h) Identify location of, and characterize access control points for evacuating personnel and reentry. As a team becomes available it will be deployed to assess contamination at the access control points. Radiation Control Technicians and Health Physicists will provide survey support at the control points. The intended location of the control points will be surveyed with alpha survey instrumentation (Nuclear Research Corporation Health Physics kits) to a level of 20 dpm/100 cm (DOE release level).

MONITORING & SAMPLING MANAGER: _____

LOCAL CONCURRENCE: _____

STATE CONCURRENCE: _____

TRIBAL CONCURRENCE: _____

LFA CONCURRENCE: _____

FRMAC DIRECTOR: _____

SEO CONCURRENCE: _____

FIGURE H-3. ***EXAMPLE OF A FRMAC MONITORING AND SAMPLING IMPLEMENTATION PLAN (concluded)***

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APPENDIX I

FRMAC POSITION DESCRIPTIONS

Key Federal Radiological Monitoring and Assessment Center (FRMAC) personnel are described in the following functional profiles. An expanded listing, including all FRMAC positions, will be included in the new *FRMAC Logistics and Staffing Manual* to be published in 2005.

I.1 FRMAC DIRECTOR

The FRMAC Director, appointed by the manager of the U.S. Department of Energy's National Nuclear Security Administration's Nevada Site Office (NNSA/NSO), with DOE Headquarters (DOE/HQ) concurrence, may be the Senior Energy Official (SEO)[6] managing DOE off-site resources. The FRMAC Director oversees the activities of all FRMAC personnel provided by any DOE Operations Office, DOE laboratory, DOE contractor, and other federal or state agencies. The Director is responsible for the overall execution of the FRMAC response. The Director is also responsible for establishing communication with the Lead Federal Agency (LFA), the state(s), local authorities, and other federal agencies to carry out the objectives and operations of the FRMAC.

I.2 DEPUTY FRMAC DIRECTOR

The Deputy FRMAC Director is appointed by the FRMAC Director and functions as the Director when the Director is unavailable. For a 24-hour FRMAC, the Deputy becomes the Director during the night shift. The duties of the Deputy are the same as those of the FRMAC Director.

I.3 LFA AND STATE REPRESENTATIVES

The LFA and state representatives work directly with the FRMAC Director and Deputy in establishing FRMAC priorities and in reviewing overall FRMAC activities. The LFA representative coordinates requests from the participating federal agencies and, with state representatives, provides input to the FRMAC Director about overall needs for off-site monitoring and assessment to fulfill the priorities of the LFA and state(s).

[6] During a nuclear weapons accident, a nuclear terrorist threat, or when DOE is the LFA, DOE will appoint both an SEO and a FRMAC Director.

I.4 U.S. Environmental Protection Agency (EPA) Senior Official

The EPA becomes responsible for FRMAC management after the emergency phase is over. Until this transfer, the senior EPA official functions as a senior staff liaison official and interfaces directly with the FRMAC Director.

I.5 Senior Scientific Advisor (SSA)

The SSA is a national expert in radiation health effects and environmental impacts of the radioactive material involved. The SSA (with staff if needed) will provide an overview to the FRMAC Director about the health effects and environmental impacts of the emergency. The SSA will advise the FRMAC Director about technical activities to meet the overall FRMAC objectives and will work closely with the technical managers in the field organization, as well as the LFA, state(s), and local officials, if necessary.

I.6 Special Staff

The Special Staff assists and advises the FRMAC Director with administrative and legal concerns, public affairs, and quality assurance. The activities of the Special Staff are under the oversight of the Chief of Staff who is appointed by the FRMAC Director. The Legal Coordinator will provide legal advice to the FRMAC Director concerning FRMAC operations and personnel. The Public Affairs Officer (PAO) will advise the FRMAC Director about news media activities associated with the emergency and will interface with the LFA and state PAOs and media personnel, where appropriate. The quality assurance coordinator will oversee all FRMAC activities as related to quality assurance to "ensure the technical integrity of the FRMAC data," as defined in the Federal Radiological Emergency Response Plan (FRERP).

I.7 Liaison Manager

The Liaison Manager provides information through FRMAC technical liaison representatives to the LFA, state(s), local authorities, Federal Emergency Management Agency (FEMA) Disaster Field Office (DFO), and other agencies and/or emergency response centers, as needed. The liaisons may also be a conduit for requests to the FRMAC.

The liaison function ensures timely transmittal of critical monitoring and assessment information to the LFA, state(s), the facility operator (if there is one), and other federal agencies, as approved by the LFA. The resolution of conflicts in data from other sources is facilitated and expedited through the FRMAC liaison personnel who are assigned to the response facilities. Liaisons, located in other response centers (not the FRMAC), communicate with the FRMAC by telephone, fax, modem, and still video.

I.8 OPERATIONS MANAGER

The Operations Manager assists and advises the Director in field implementation, execution, and coordination of all resources at the CM/FRMAC. The Operations Manager advises the Director about all staff and emergency functions and monitors the status of all requests and events flowing through the CM/FRMAC. The manager will be the focal point for authorization for all persons coming into the CM/FRMAC, both participants and visitors.

The Manager is responsible for information flow and documentation within the CM/FRMAC and for ensuring the completion of each request made by the LFA and state(s). The Manager will serve as the conduit for information provided to the FRMAC Director and will review all data prior to presenting them to the managers (Support, Assessment, Monitoring, Health and Safety, and Laboratory Analysis).

I.9 DEPUTY OPERATIONS MANAGER

The Deputy Operations Manager functions as the Operations Manager when the Operations Manager is unavailable. For a 24-hour CM/FRMAC, the Deputy becomes the Director during the night shift. The duties of the Deputy are the same as those of the FRMAC Director.

I.10 OPERATIONS STAFF

The status of all FRMAC activities, DOE assets (personnel, equipment, supplies, and files), and needs for additional resources, if applicable, will be recorded. Requests and actions will be documented, tracked, and maintained on a status board for the Director during the emergency phase. In addition to handwritten records, all status records are kept in a traceable and retrievable database for archiving purposes. Assurance that FRMAC activities are consistent with long- and short-range planning will also be provided.

I.11 SUPPORT MANAGER

The Support Manager is responsible for providing administrative services, communications, mechanical systems, photo and video, logistics, security, and general supplies and services (base support) to all FRMAC participants, as needed.

I.12 MONITORING MANAGER

The Monitoring Manager will coordinate and direct data acquisition personnel, including those responsible for aerial radiological surveying, field monitoring, sampling, sample analysis, and environmental dosimetry. All environmental monitoring teams working out of the FRMAC (including DOE, EPA, other federal agencies, and the state[s]) will be coordinated by the Manager. In conjunction with the SSA, the Assessment Manager, and the Laboratory Analysis Manager, the Monitoring Manager evaluates the need for field information and radioanalytical data and establishes

priorities for the monitoring resources. The Quality Assurance group ensures that all monitoring measurements, sample collection, and derived analytical data are scientifically defensible, of acceptable known quality, and meet FRMAC requirements.

I.13 ASSESSMENT MANAGER

All environmental radiation data that are gathered or received by the FRMAC flow through the Assessment group to the FRMAC Director. The Assessment Manager oversees the handling, processing, evaluation, assessment, reporting, and archiving of all the data; reviews and assembles all of the environmental data to develop an overview status and to provide technical interpretation of the radiological situation; and ensures that the appropriate documents exist to ensure the technical integrity of the data.

The Assessment Manager works closely with the SSA to identify monitoring and radioanalytical data needed to meet FRMAC assessment requirements. Both work closely with the Monitoring Manager and the Laboratory Analysis Manager in establishing priorities for the monitoring and laboratory resources that most efficiently meet these data requirements.

I.14 HEALTH AND SAFETY MANAGER

The Health and Safety Manager is responsible for all health and safety issues for FRMAC personnel. This includes radiation protection, industrial hygiene, general safety, and medical care or treatment at the FRMAC for all federal agency and contractor FRMAC participants. The Manager will coordinate and direct all health and safety efforts in conjunction with the other FRMAC managers and will ensure that personnel radiation exposures are maintained at levels as low as reasonably achievable (ALARA) within the appropriate exposure standards. The Safety Coordinator (within this group) will work with the FRMAC managers to ensure that all FRMAC operations (both inside the FRMAC facility and outside in field operations) are being conducted in a safe manner and in compliance with all applicable federal regulations. Also within the Health and Safety group are the Radiation Emergency Assistance Center/Training Site personnel and/or the regional medical coordinator who will provide appropriate information in the event that radiological medical support is requested by a federal agency or the state(s).

I.15 LABORATORY ANALYSIS MANAGER

The Laboratory Analysis Manager coordinates and directs all CM/FRMAC laboratory analytical activities and maintains close coordination with mobile and fixed facility laboratories providing the analytical support to CM/FRMAC. The Laboratory Analysis Manager also defines data quality objectives (DQOs), analytical methods, minimum detectable activity (MDC), and prioritizes analyses and samples. He/she acts as a point of contact for queries regarding the status of any sample or reprioritization and provides ES&H oversight for sample handling and mobile laboratory areas. The Laboratory Analysis Manager reviews data for accuracy and prudence and ensures that analysis results are forwarded to the database in a useable format.

I.16 COMMUNICATIONS SPECIALIST

The Communications Specialist provides coordination and guidance for communications services and equipment. This individual ensures that communications and frequency requirements are arranged and established during operation.

I.17 LOGISTICS SPECIALIST

The Logistics Specialist carries out initial logistics operations for the CMRT I and CMRT II. The Logistics Specialist is responsible for providing administrative, logistical, security, facilities, and mechanical systems support to deployed personnel. In addition, the Logistics Specialist prepares for the arrival of follow-on assets.

I.18 GIS SCIENTIST

The GIS Scientist is responsible for the capture, storage, retrieval, and display of radiological data. Plots are produced with contours of radiation data, dose projections, and/or federal protective action recommendations associated with spatial and geographical data such as maps and aerial photographs. GIS can also provide maps for field teams.

I.19 DATABASE SPECIALIST

The Database Specialist prioritizes, organizes, and inputs radiological, environmental, geographic, and other pertinent information into the FRMAC database system. A variety of data reports can be generated, as needed. The database personnel are responsible for creating and maintaining the comprehensive, traceable, and quality-assured database. This individual will serve as radio control for field teams during Phase I deployment.

I.20 FIELD MONITORING SPECIALISTS

Field Monitoring Specialists execute monitoring and sampling duties according to standard operating procedures. Field monitoring is conducted under the direction of the Monitoring Supervisor. Field Monitoring Specialists can accompany first responders into potentially contaminated situations during lifesaving activities. Field Monitoring Specialists can integrate with local and RAP response teams to ensure standardized monitoring procedures. Field Monitoring also includes one high-purity Germanium (HPGe) *In Situ* Measurement Specialist. This individual makes HPGe *In Situ* measurements and performs standardized analysis of spectral data.

I.21 OTHER KEY PERSONNEL IN THE FRMAC FACILITIES

Other key personnel expected to be located in the FRMAC facilities, but who are not a part of the FRMAC operations, are described below.

I.21.1 Representatives from Other Agencies to the FRMAC

Federal agencies that need information to fulfill their statutory and/or regulatory obligations are represented at the FRMAC but are not part of the FRMAC operations. These agency representatives act as information channels to and from their headquarters. They cannot, however, send radiological data to their headquarters without LFA approval and until approved by the FRMAC Director. Other local agencies within the state(s), including utilities, may also be represented.

I.21.2 Advisory Team

Although the Advisory Team is not part of the FRMAC, it is co-located with the FRMAC. The Advisory Team for Environment, Food, and Health, composed of representatives from the U.S. Environmental Protection Agency, U.S. Department of Agriculture, and U.S. Department of Health and Human Services, provides direct support to the LFA in evaluating and recommending protective actions.

I.22 HOME TEAM SUPPORT

Home Teams are staffed at the National Laboratories and the Remote Sensing Laboratory in support of fielded CM teams. In addition to logistics support, Home Teams provide various types of technical support:

- Provide Automated Consequence Report for Insidious Dispersal (ACRID) or NARAC effects models to field team as soon as the field team arrives on-scene allowing very early initial assessment of the situation.
- Can run Turbo FRMAC calculations and provide results to field Assessment Scientists early in the event.
- Provide early map and GIS location information to the field teams.
- Perform effects and prediction models run in parallel with the fielded team to confirm field team results and evaluate additional scenarios in support of field team efforts.
- Provide the fielded CMPT or CMRT with weather data related to the event site in the event that web access is not available, or if better information is available.
- Home Team Assessment Scientists can perform the more complex/involved assessment calculations supporting the field Assessment Scientists.
- Provide technical information to Assessment Scientists to aid in out of the ordinary assessment requests.

APPENDIX J

GLOSSARY

Aerial Measuring System	An airborne system used to detect, locate, and measure low levels of airborne radiation. In addition to multi-spectral sensing capabilities and instrumentation for determining geodetic positions, the system can acquire aerial photography
Airborne Radioactive Material	Radioactive material dispersed in air. Airborne radioactive material may include colloidal suspensions, windblown dust, fumes, mists, vapors, gases or any other airborne media.
Assessment	Evaluation and interpretation of information to develop a basis for making decisions; for example, an evaluation of radiometric data that may include dose estimates and recommendations for protective actions to minimize harmful effects from radiation.
Contamination	A condition that exists when an unwanted material has spread to previously unaffected areas at levels that may be harmful to public health and the environment or interfere with various measurements.
Deposition	The accumulation of (radioactive) material on unprotected surfaces of plants, structures, soil, or the bottom of ponds, streams, etc., from airborne release(s).
Dosimeter	An instrument for measuring the accumulated or total dose from exposure to ionizing radiation.
Emergency Operations Center (EOC)	The center from which emergency response personnel and teams receive field instructions and directions during emergency situations. Emergency Operations Centers are usually staffed and operated by state and local personnel.
Emergency Operations Facility (EOF)	A licensee-controlled and operated support center for management of emergency response, coordination of radiological and environmental assessments, development of recommended public protective actions, and coordination of emergency response with Federal, state, and local areas.

Evacuation	The process of removing people from a hazardous area to a safe area. As used here, evacuation refers to removal of a population for a short period (not more than a few days), and relocation refers to removal for longer periods.
Federal (organizations)	Agencies, departments, or other entities of the Federal government.
Federal Radiological Emergency Response Plan (FRERP)	A comprehensive, conceptualized, multi-agency plan for coordinating local, tribal, and Federal governmental response to radiological emergencies that describes roles and responsibilities of participating Federal agencies.
Federal Radiological Monitoring and Assessment Center (FRMAC)	A center in the vicinity of a radiological incident that coordinates the Federal radiological monitoring and assessment response to an incident that threatens the health or well being of affected populations. The center, which operates at offsite locations in the affected state(s) or tribal area(s), does not generally need to be located near the emergency operations centers (EOC), as long as operations involving the lead Federal Agency (LFA), FRMAC and local entities can be coordinated. The LFA has overall responsibility for coordination and/or operation of the incident.
Lead Federal Agency (LFA)	The Federal agency that owns, authorizes, regulates, or is otherwise responsible for managing deployment of personnel and response to an emergency with the authority to take whatever action is necessary to stabilize the situation.
Local (organization)	The local government agency or office having the principal or lead role in emergency planning and preparedness. Generally this will be a county government. Other local government entities; *e.g.,* towns, cities, municipalities, tribe, etc., are considered to be sub organizations with supportive roles to the principal or lead local government organization responsible for emergency planning and preparedness. In some cases, there will be more than one lead organization at the local level. One designated lead organization is preferable.
Monitoring	Continuing collection of data to assess information, determine adequacy of radiation protection practices and to identify potentially significant changes in conditions or radiation protection.
Offsite	The area outside the boundary of a site or facility, but within the area of influence.
Offsite Federal Support	The Federal role assisting during mitigation of offsite consequences during an emergency and protection of public health and safety, including assistance identifying and implementing measures to protect public health.

Onsite	Area within the boundary of a site or facility established by the owner or operator, a transporter or the LFA of the affected facility for administrative control during an emergency. Specifically, the onsite area includes everything within the boundary of a nuclear power plant, a DoD installation, a DOE facility, a National Defense Area, or a National Security Area. It also includes the controlled area surrounding a radioactive spill in a transportation incident. In the event of a terrorist event, "on-site" would be defined as the area where the Incident Commander defined a perimeter to identify the crime scene or area where dangers may still exist. Once the initial criminal and forensic investigation is completed, the "on-site" boundary would be lifted and the state or local authorities would assume control.
Onsite Federal Support	Assistance by a Federal agency that owns, authorizes, regulates, or is otherwise responsible for the radiological facility, material being transported, etc; *e.g.,* the LFA. Federal support is in response to state and local assistance efforts and supports the owner or operator's efforts to manage and thereby prevent or minimize offsite consequences during an incident.
Protective Action Guide (PAG)	The projected dose to an individual from an unplanned release of radioactive material at which a specific protective action to reduce or avoid that dose is recommended.
Public Affairs Officer (PAO)	Representative from a Federal agency who works in cooperation with other Federal, state, and local agencies, to coordinate public releases of information during an event.
Radiation Emergency Assistance Center/Training Site (REAC/TS)	A multi-purpose medical/training facility located at Oak Ridge, Tennessee, that can provide medical care for all types of radiological injuries, assist during radiological emergencies and provide medical and health physics advice and training.
Radiological Assistance Program (RAP) Team	A team dispatched to the site of a radiological incident by the responding regional DOE office.
State (organization)	The state government agency or office having the principal or lead role in emergency planning and preparedness. There may be more than one state involved, resulting in separate application of evaluation criteria for the affected states. To the extent possible, however, one state should be designated as the lead.

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APPENDIX K

FRMAC MANUALS

The Federal Radiological Monitoring and Assessment Center (FRMAC) manuals have been extensively peer reviewed. As the manuals are used, FRMAC expects to receive many comments and suggestions related to their content and application. These comments and suggestions will be evaluated by the appropriate FRMAC Working Group and they will be incorporated into future revisions as suitable. Comments, suggestions, and/or requests for manuals should be addressed to:

U.S. Department of Energy
National Nuclear Security Administration
Nevada Site Office
Attn: FRMAC Program Manager
P.O. Box 98518
Las Vegas, NV 89193-8518

Information contained other in FRMAC manuals (cited below) may be valuable for reference purposes during an emergency. These manuals are available to the public on the NNSA/NSO website:

http://www.nv.doe.gov

FRMAC Assessment Manual, Vol. 1, 2, and 3 (April 2003)

Provides information in methods and pre-assessed default scenarios as well as useful tables, chart, worksheets, and a glossary relevant to the work of the Assessment group.

FRMAC Health and Safety Manual (September 2001)

The *FRMAC Health and Safety Manual* provides for radiation safety, industrial hygiene, occupational safety, and emergency medical care. The manual includes information on Radiation Exposure Guidelines, personnel dosimetry, contamination control (including limits on contamination for release of equipment to uncontrolled areas), radioactive and hazardous waste packaging, and personal protective equipment.

FRMAC Monitoring and Analysis Manual, Volumes 1 (April 2004) and 2 (old Volume 1, September 2002)

FRMAC Monitoring Division Manual, Volume 1,

FRMAC Monitoring Division Manual, Volume 2, "Radiation Monitoring and Sampling," describes the procedures employed by FRMAC field teams in performing radiological monitoring and sampling activities provides guidance for radiochemical analysis of samples collected during a radiological emergency.

FRMAC Laboratory Analysis (May 2004)

The *FRMAC Laboratory Analysis Manual* provides guidance for radiochemical analysis of samples collected during a radiological emergency to provide scientifically defensible data of acceptable quality.

Upcoming Manuals:

Overview of FRMAC Operations

The *Overview of FRMAC Operations* is in the process of being re-written to be published as a pamphlet. It will provide a concise overview of the FRMAC phased-response concept with a listing of the signatory agencies. (Anticipated publication 2004)

FRMAC Logistics and Staffing Manual

The *FRMAC Logistics and Staffing Manual* will provide a complete discussion of FRMAC logistics and staffing requirements including position descriptions for all FRMAC field positions.

This manual will be published in 2005.

APPENDIX L

KEY REFERENCE DOCUMENTS

Primary Federal Plan

"Federal Radiological Emergency Response Plan (FRERP)," *Federal Register, 48:90, (8 May 1996).*

Supporting Federal Statutes, Orders, Regulations, and Plans

Atomic Energy Act of 1954, amended, Public Law 83-703.

Department of Energy Organization Act, U.S. Codes, Congressional and Administrative News, 95th Congress, First Session, 1977.

Federal Response Plan, as amended, Public Law 93-288, April 1992.

Interagency Radiological Assistance Plan, April 1975.

Initial National Response Plan, U.S. Department of Homeland Security, September 2003.

Radiation Control for Health and Safety Act, Public Law 90-602
(Subpart 3 of Title 42 USC 241).

Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 93-288,
May 22, 1974.

Title 10 CFR 835, "Occupational Radiation Protection," December 14, 1993,
Revised January 1, 2003

Title 29 CFR 1910, "Occupational Safety and Health Standards," Subpart 1910.120, "Hazardous Waste Operations and Emergency Response." Revised July 1, 2003

Title 44 CFR, "Emergency Management and Assistance," October 1, 1992,
Revised October 1, 2001.

Title 44 CFR, "Radiological Emergency Planning and Preparedness," October 1, 1992, Revised October 1, 2001.

Executive Orders

Executive Order 13286, February 28, 2003 (Amendment of Executive Orders, and other actions, in connection with the transfer of certain functions to the Secretary of Homeland Security). Amends, among others, EO 12919, June 3, 1994; EO 12656, November 18, 1988; EO 12148, July 20, 1979.

Executive Order 12656, "Assignment of Emergency Preparedness Responsibilities," November 18, 1988.

Executive Order 12241, "National Contingency Plan," September 29, 1980.

Executive Order 12196, "Operational Safety and Health Programs for Federal Employers," February 26, 1980.

Executive Order 12148, "Federal Emergency Management," July 20, 1979

DOE Orders

DOE Order 151.1A, "Comprehensive Emergency Management System," November 1, 2000.

DOE Order 5400.1, "General Environmental Protection Program," November 9, 1988.

DOE Order 5400.5, "Radiation Protection of the Public and the Environment," February 8, 1990, and Change 1, June 5, 1990, and Change 2, January 7, 1993.

DOE Order 5500.1B, "Emergency Management System," April 30, 1991, and Change 1, February 27, 1992.

DOE Order 5500.3A, "Planning and Preparedness for Operational Emergencies," April 30, 1991, and Change 1, February 27, 1992.

DOE Order 5500.10, "Emergency Readiness Assurance Program," April 30, 1990, and Change 1, February 27, 1992.

DOE Order 5530.1A, "Accident Response Group," September 20, 1991.

DOE Order 5530.2, "Nuclear Emergency Search Team," September 20, 1991.

DOE Order 5530.3, "Radiological Assistance Program," January 14, 1992, and Change 1, April 10, 1992.

DOE Order 5530.4, "Aerial Measuring System," September 20, 1991.

DOE Order 5530.5, "Federal Radiological Monitoring and Assessment Center," July 10, 1992, and Change 1, December 12, 1992.

DOE/NV Order 5500.4A, "Public Affairs Policy and Planning Requirements for Emergencies," June 8, 1992.

Other Federal Agency Documents

Assistant to the Secretary of Defense. *Nuclear Weapon Accident Response Procedures (NARP) Manual,* DoD 5100.52-M, September 1990; Defense Nuclear Agency, Alexandria, VA.

McKenna, T. *et al*. *RTM-93 Response Technical Manual,* NUREG/BR-0150, Vol. 1, Rev. 3, November 1993; Nuclear Regulatory Commission, Division of Operational Assessment, Office for Analysis and Evaluation of Operational Data.

Nevada Test Site Radiological Emergency Response Plan for a Prompt Massive Venting Following an Underground Nuclear Test, DOE/NV, Nevada Test Organization Interface Plan. Rev. 2.2, May 1993; Las Vegas, NV.

Nuclear Regulatory Commission Appropriation Authorization, Public Law 96-295, Section 304, June 30, 1980.

U.S. Department of Health and Human Services/U.S. Food and Drug Administration. *Accidental Radioactive Contamination of Human Food and Animal Feeds,* August 13, 1998. Electronic version available at: www.fda.gov/cdrh/dmqrp/84.html. Accessed: March 31, 2004.

U.S. Environmental Protection Agency. *EPA Manual of Protective Action Guides and Protective Actions for Nuclear Incidents*, May 1992. Electronic version available at: www.epa.gov/radiation/rert/pags.htm. Accessed: March 31, 2004.

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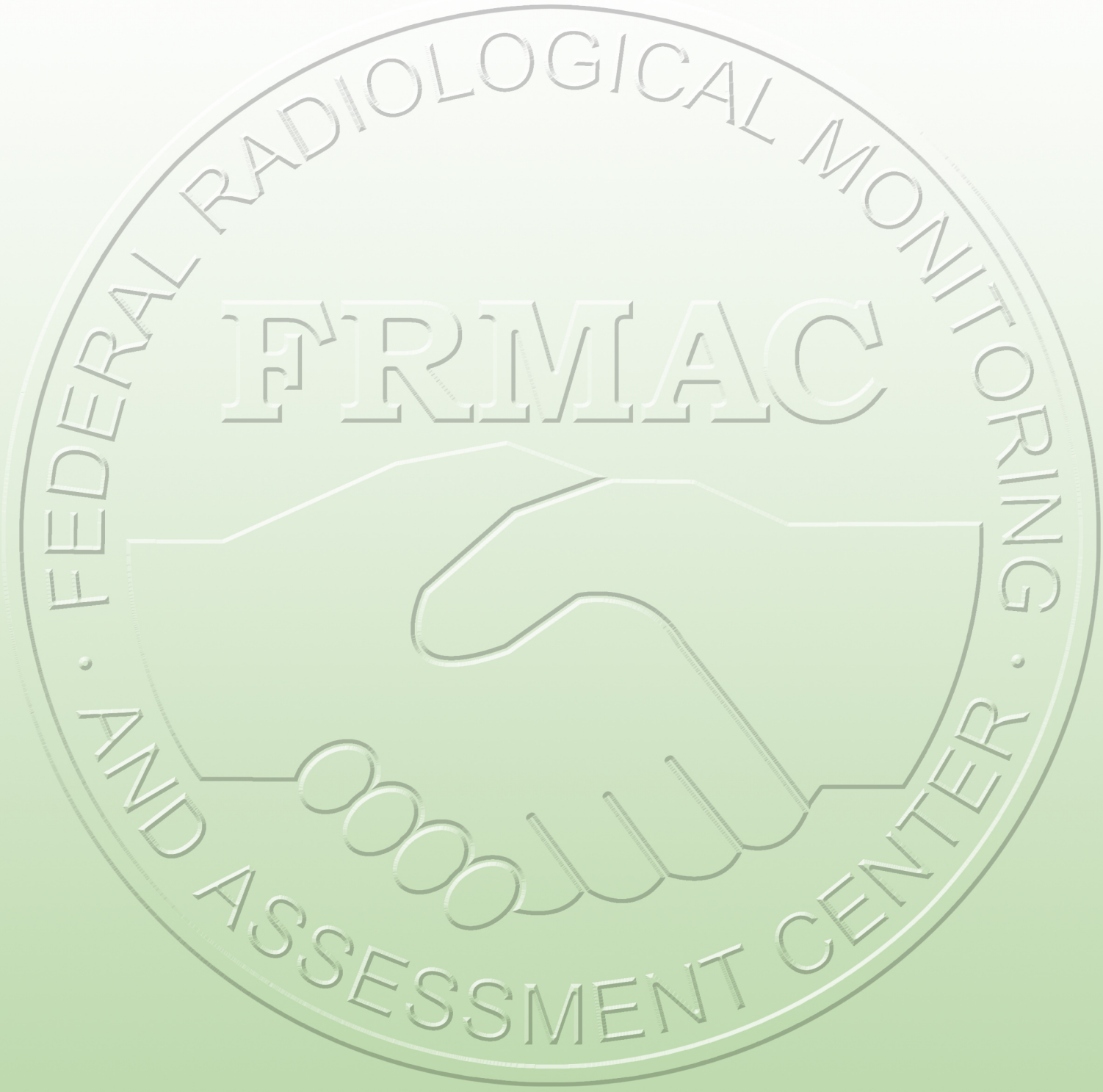
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